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ORIGINAL MEMOIRS.

STUDIES ON THE PATHOLOGY AND ETIOLOGY OF OBSTRUCTIVE HYPERTROPHY AND ATROPHY OF THE PROSTATE GLAND.

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FOR the purpose of this study, there have been placed at my disposal specimens removed by operation in a series of twenty-three cases in the clinic of Dr. Lewis S. Pilcher at the Methodist Episcopal Hospital, and for purposes of comparison various specimens of normal prostates.

There are certain points in the anatomy of the normal prostate which should be made clear, since they are very poorly, and often incorrectly, stated in most of our text-books, and are important in relation to that which is to follow.

The gland is essentially composed of two lateral lobes, connected together in front of the urethra by the anterior commissure, and beneath the urethra by the posterior commissure. The prostatic urethra traverses the gland from base to apex a little in front of its middle. The position of this portion of the urethra varies, sometimes being more anteriorly and again more posteriorly placed. The cortex of the gland is made up almost entirely of non-striped muscular tissue

mixed with a small amount of fibrous tissue, which can be separated from the glandular elements with difficulty. This comprises what is known as the capsule of the prostate. Outside this is an indefinite sheath of fibrous tissue, in which is found the prostatic plexus of veins. Its identification and demonstration are difficult. The ejaculatory ducts and twenty or thirty prostatic ducts open into the prostatic urethra.

The organ is composed of stroma and glandular elements, the exact proportions of which vary. This range of variation is relatively great, in the writer's opinion more so than in any other gland in the body, being affected by age, function, and the calls of nature upon it. According to various careful observers, the glandular elements make up from one-third to five-sixths of the substance of the gland. The very fact of such a discrepancy in the estimates of these men shows how great the variation may be. The gland consists of forty to sixty lobules of the alveolar type. These lobules, however, are not distinct, and are traced with difficulty.

A number of alveoli empty into a single duct, a few of these ducts opening into a larger main duct which opens obliquely into the urethra. The alveoli are lined with columnar epithelium. The stroma is composed of muscular and connective-tissue elements in varying proportions. This, too, is influenced by age and function. Elastic tissue is also present. The small blood-vessels and capillaries run through the stroma. Connective-tissue cells,—especially numerous and large in the young,—plasma cells, and leucocytes are scattered throughout the connective tissue. From the dense capsule, according to Walker,¹ whose studies are among the most complete of recent writers, strong bands of muscular tissue and connective tissue pass into the gland and subdivide, surrounding the lobules. The muscular divisions give to each lobule a distinct circular and longitudinal coat; the circular fibres ramifying among the lobules in a figure-of-eight course; the longitudinal layer lying immediately next to the gland substance, encasing the lobule more or less completely. The connective tissue ramifies among the cellular tissue, forming a

net-work on which the cells rest. The existence of a *membrana propria* is questionable. The elastic tissue forms a small but important element of the stroma. Arising from a longitudinal sheath of fibres surrounding the urethra, the fibres pass outward and form a net-work around the prostatic ducts, giving to each a distinct sphincter. (Walker.¹) The fibres extend more deeply into the gland, among the connective-tissue bundles and around the lobules.

PATHOLOGICAL CHANGES.

The specimens which have been studied by us have all been those removed from patients during life, for the relief of urinary obstruction.

I. *Gross*.—In these cases we have found three distinct types of prostates. One the *greatly enlarged, soft prostate*; second, the *relatively small, contracted, hard prostate*; and a third, *mixed type*. I may add here that in cases giving a positive gonorrhœal history each type has been seen. The same is true of the cases giving an absolutely negative gonorrhœal history, and in the cases where there was no cystitis, and also where cystitis was present. Thus of the nineteen cases where there was no gonorrhœal history, the prostate was of the large, soft variety in ten cases, small and hard in three cases, of the mixed type in six cases. Of the gonorrhœal cases, two presented large, soft prostates, and two of the mixed type. Of the cases with cystitis, two of the prostates were hard and contracted, five of the mixed type, and seven of the large, soft variety. Of the cases in which there was no history of venereal disease and no cystitis, one presented a small, hard prostate; three large, soft prostates; and two the mixed type. So it would seem that infection did not in any way influence the variety of the pathological changes.

The *massively hypertrophied prostates* vary greatly in their form, consisting either of an enlargement of both lateral lobes, of one lateral lobe, of the lateral lobes and a median enlargement projecting into the bladder (Figs. 1 and 2),—this is the most common,—or a median enlargement alone.

An enlargement of the posterior commissure is rarely seen, and of the anterior commissure never. The entire gland is surrounded by a thickened capsule of non-striped muscular fibres containing a small amount of fibrous tissue (Figs. 1, 2, and 3). This capsule is thicker and better defined than in the normal prostate; its fibres are more distinct, and it can more easily be stripped away from the gland proper. It entirely surrounds the glandular mass (Figs. 1, 2, and 3), and, covering the portion which projects into the bladder, it lies immediately beneath the mucous membrane lining the bladder (Fig. 1), the sheath being absent here. In the suprapubic operation, when the entire gland is removed, this capsule is not disturbed, but is shelled out with the gland from the sheath covering the prostatic body (Fig. 1). In this way the prostatic plexus of veins is exposed, and dangerous hæmorrhage may occur. In the perineal operation this muscular capsule is opened into, and the hypertrophied glandular masses are shelled out without exposing the veins, and the capsule is left behind. The surface of the hypertrophied prostate is irregular, presenting bulgings and valleys corresponding to the uneven hypertrophy of the glandular, muscular, and connective-tissue elements. In bilateral enlargement the sphincter vesicæ is not destroyed, as it generally is in the other forms. Retention results from purely mechanical means.

The urethra is distorted, depending upon the size, direction, and extent of the hypertrophy (Figs. 2 and 3). It may be lengthened and compressed, its plane depressed downward and backward, and sometimes curved laterally. The mucous membrane lining the prostatic urethra is intimately related to the gland itself, and can only be separated from it with difficulty (Fig. 4).

The size of the obstructing prostate varies from the normal size, 200 to 300 grains, to several ounces. The weight of the largest in the present series was five ounces.

The *atrophic form*, on the other hand, may be even smaller than normal. In the cases of this type operated on by us, the average amount of tissue removed was about 250 grains. In



FIG. 1.—Photograph of hypertrophied prostate removed by suprapubic route. Showing bilateral and median enlargement. At vesical pole, A, the capsule and mucous membrane of the bladder are shown stripped back from the glandular portion of the gland. At B is seen the circular capsule which passes entirely around the gland. Cross-sections at this point are shown in Figs. 2 and 3



FIG. 2.—Photograph of cross-section at B of specimen shown in Fig. 1. Showing capsule, distortion of urethra, and distribution of hypertrophy.

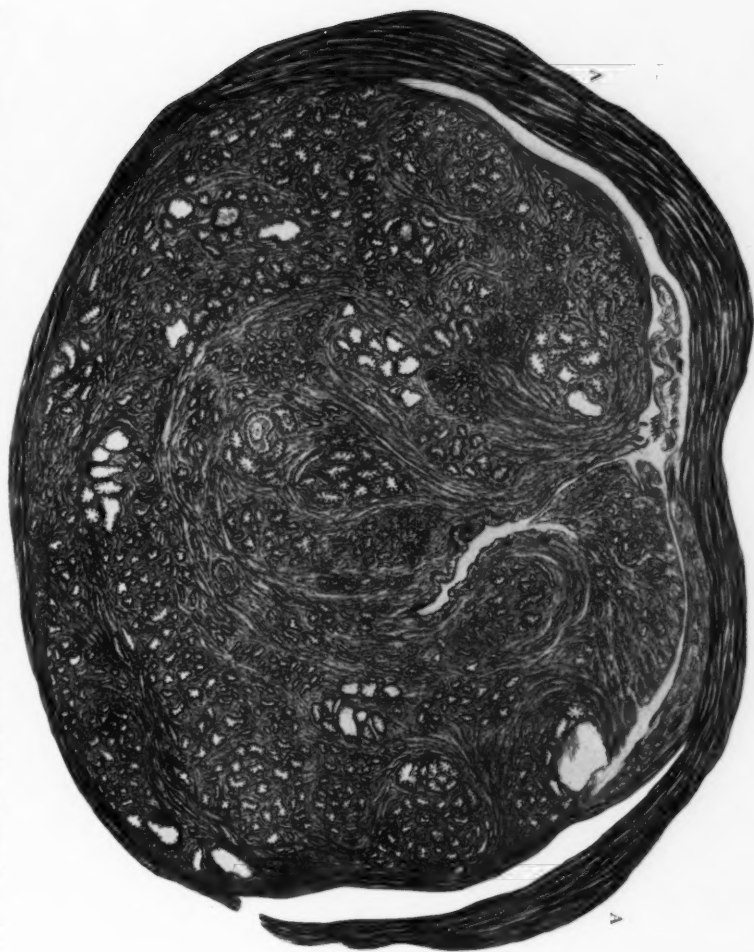


FIG. 3.—Cross-section at B of specimen shown in Fig. 1 slightly magnified. Note relation of capsule A, A, to glandular structure; also distortion of the urethra and distribution of glandular and fibromuscular hypertrophy.

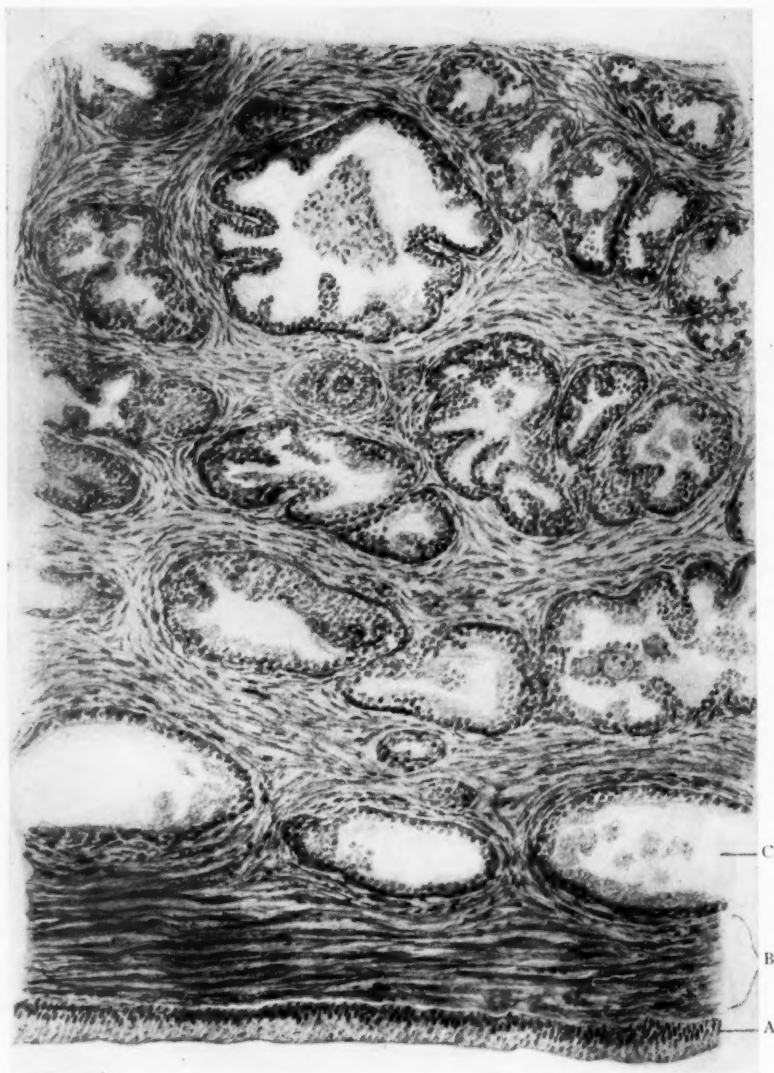


FIG. 4.—Showing relation of the mucosa of the prostatic urethra to the substance of the prostate. Camera lucida drawing from same section as Fig. 3. Note the intimate relation between the epithelial layer, A, and the underlying fibromuscular layer, B, which is not in any way differentiated from the musculo-glandulo-fibrous layer, C, which makes up the bulk of the hypertrophied prostate. In the musculo-fibrous layer, B, the muscular elements predominate.

these cases the disease affected both lateral lobes, with in some cases a very small median enlargement. The prostate is hard and firm, the capsule densely adherent. The sheath and the fibrous connective tissue of the perineal outlet, in general, are more dense and tough, rendering the identification and isolation of the perineal structures more difficult. The surface of the gland is very irregular. The direction of the urethra is distorted, but not much increased in length. The patients presenting such prostates suffered more from retention than from incontinence.

II. *Microscopical*.—Sections of the hypertrophied prostate vary greatly in the distribution of the pathological changes. The most striking change from the normal is the *relative and absolute increase in the amount of glandular tissue*. All degrees of change from the normal alveoli to the formation of cysts and large adenomatous-like masses are seen (Figs. 5 and 6). The ducts are in many places dilated and filled with retained secretion, often degenerated epithelium, leucocytes, amylaceous bodies, and calculi. These contents may even obstruct the ducts. In the tissue surrounding the ducts are often seen round cells and polymorphonuclear leucocytes. In some places the ducts are seemingly constricted. Laurence⁴ found by injecting fluid metal into the urethra, that unless a high pressure was used, the glands in normal prostates could not be injected because of their small caliber. On the other hand, in the hypertrophied prostates the injection was easy and more complete because the terminal (urethral) tubules were enlarged and dilated, and did not obstruct the influx of the metal.

The glands and acini are greatly but unevenly dilated and hypertrophied (Figs. 3 and 4). A whole lobule may be enlarged without any dilatation of the acini, presenting the appearance of an adenoma, but differing from it in that it has a definite, active secretion which is emptied into the urethra by the ducts. A small portion of a lobule or a single acinus may be affected. Crandon⁶ explains this fact as due to obstruction of the main duct in the first case, or to the obstruc-

tion of one or more of the smaller ducts, as the case may be. This explanation, however, is very unsatisfactory. Crandon in his article⁶ presents an illustration showing a few scattered glandular elements beneath the mucous membrane of the bladder just at the beginning of the urethra, from which it is claimed the median enlargement develops. How can the theory of the obstruction of the ducts of these few scattered glands account for the great median enlargement which is often seen, containing many thousand times more secreting surface than in the normal, and in which there appear no cysts larger than are found in the normal functioning gland? The whole picture is not one of passive dilatation, but of active hyperplasia and hypertrophy (Figs. 3, 4, and 5). The alveoli contain débris, desquamated cells, amyloid bodies, concretions, and often leucocytes; but these, too, are found in normal functioning glands.

My own observations as to the relative change in the amount of muscular tissue in the hypertrophied prostate does not agree entirely with that of other workers. The two coats surrounding the dilated acini do not show as distinct a differentiation as in the young prostate. From the nature of the glandular change, it is natural to suppose that the surrounding tissue will be distorted, but not necessarily changed relatively. It is only when the wall between two adjacent acini becomes thinned down to one or two layers of cells that the muscular fibres disappear (Fig. 5), and only the connective-tissue framework remains. In fact, in many cases the muscular tissue shows a moderate but true hypertrophy.

The amount of connective tissue varies in different specimens. Most observers claim it is everywhere increased, but not relatively as much as the glandular tissue. I cannot entirely agree with this. It is true that in many cases the connective tissue is increased relatively, but sometimes the proportion of muscular hypertrophy is almost as great as the connective-tissue increase (Figs. 4 and 5). Throughout this tissue at different points varying degrees of round-cell infiltration are to be seen. In some cases arteriosclerosis of an



FIG. 5.—Exact drawing from a portion of an hypertrophied and dilated lobule. Showing the thinning out of the musculo-fibrous stroma. The lighter areas of the stroma represent muscular tissue and the heavier lines connective tissue. In some places the walls separating the acini have disappeared.

(For the drawings from which Figs. 5, 6, 7, and 8 were made, the author is indebted to Dr. Henry G. Webster.)

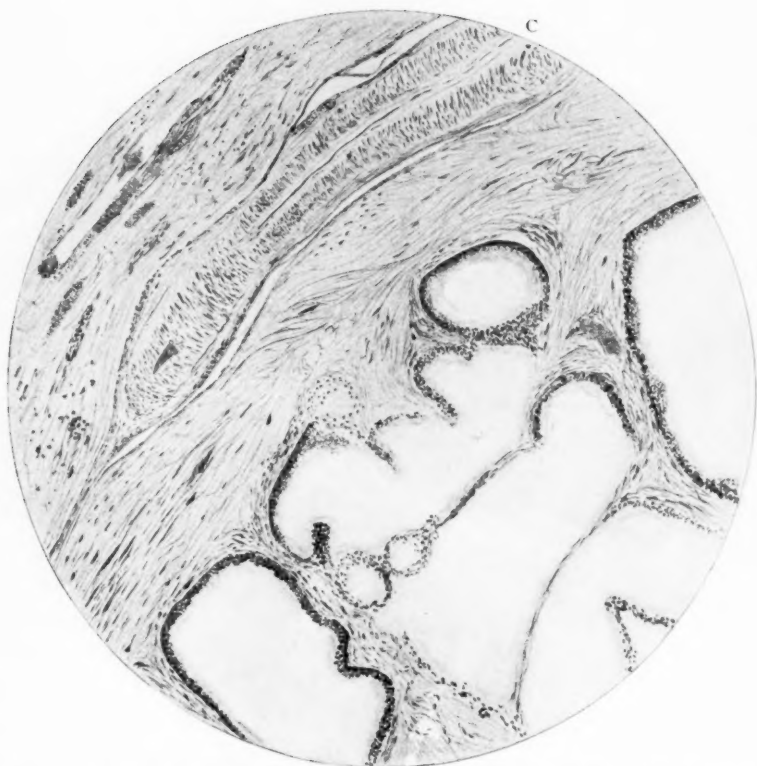


FIG. 6.—Exact drawing from periphery of same lobule as shown in Fig. 5. Showing a sclerosed vessel whose lumen is represented by a single line of endothelial cells, C. Note how the vessel wall is separated from the fibromuscular structures of the lobule, just as the fibromuscular capsule of the gland is from the glandular body itself. Small areas of extravasated blood and round cell infiltration are seen.



FIG. 7.—Exact drawing from a section of a small atrophic prostate which caused obstruction. Showing the absence of glandular elements and the great relative increase in the muscular elements. (The lighter areas represent muscular tissue, the heavier lines connective tissue.)



FIG. 8.—Section from mixed type of hypertrophy of prostate. Darker lines representing connective tissue and lighter areas unstriated muscular tissue between and around the glandular acini.

advanced stage is present (Fig. 6). In many of our cases there were seen areas of extravasated blood (Fig. 6). Again are seen areas of normal tissue.

In the *atrophic* prostates two forms have been observed. The *first* in which the glandular elements are decreased and smaller than normal. In these prostates the amount of muscular tissue present seems to exceed the amount of new connective tissue, which in some cases is relatively diminished. In one case the predominance of muscular tissue was very marked (Fig. 7). The *second* form presents a combination of compressed glands which predominate, and a few dilated hypertrophied lobules which, however, never reach any considerable size (Fig. 8).

It is interesting to note here that Daniel,⁵ who examined a series of prostates removed post-mortem from the bodies of patients not complaining of prostatic symptoms, *i.e.*, were devoid of obvious enlargement, and who in many cases were under thirty years of age, found exactly the same pathological appearances, with some exceptions, as have been described.

Etiology.—Ciechanowski,⁷ quoted by Greene and Brooks,⁸ and Crandon⁶ concludes that "the common starting-point of the enlargement and certain forms of atrophy of the prostate is to be sought for in the productive connective-tissue processes which occur in the stroma."

Before accepting this theory, consider first the life history of the prostatic body. Heisler ("Text-Book of Embryology," 1899, p. 234) tells us that "in the twelfth week the future prostatic urethra acquires very thick muscular walls, and the original epithelial tube pouches out into the muscular tissue in the form of little sacs, the lining cells of which assume the character of secreting epithelium. In this way is produced the aggregation of muscular and glandular tissue known as the prostate gland." Until functional activity begins, the glandular elements appear as simple branched tubular glands resembling the other urethral glands and forming an insignificant part of the prostatic body. Then the function of the gland is demanded and the glandular elements multiply. The simple

branched tubular glands become most complex in their structure, and, just as in the female breast when functioning, become separated into distinct lobules. There then arises a new demand for expression of the glandular secretion; therefore the muscular elements increase and become better differentiated, and if the prostate be examined at this time, it will be seen to be essentially a musculo-glandular body, the acini filled with secretion, degenerated epithelial elements, amylaceous bodies, etc., just as in the functioning breast. It is an actively functioning gland, varying greatly in different individuals, corresponding to the demands of its possessor upon its function. In one case we may have a glandulo-muscular body, in another a musculo-fibro-glandular body, and so on. As age advances, conditions change. In some, glandular activity ceases early, but generally not until after the degenerative changes incident to old age have made their appearance. In eight of our cases, where we have ascertained the age to which sexual intercourse was continued, the average was sixty-seven years. It is fair to suppose, then, that in these cases, at least, glandular function was kept up, and that possibly glandular hypertrophy took place in a perfectly natural way, influenced and governed by advancing age. From a study of these prostates, it has seemed to us that the hypertrophy was due more to glandular overgrowth, distorted and increased by the degenerative changes of old age, than to the influence of any extrinsic inflammatory agency constricting the ducts and causing their dilatation. The question may be asked why this does not take place in all cases. That is as difficult to answer as it is to explain why fibroids, myomata, and adenomata develop in the uterus of one woman and not in that of another. We believe that it is not necessarily the length of functional activity of the gland and the age of the individual which cause this hypertrophy, but that it is a glandular overgrowth influenced by the degenerative changes of old age in an actively functioning gland which produces the change. A previous gonorrhœal infection, or any other inflammatory process, may influence the development of the disease.

That, however, *gonorrhæal infection* is always, or even a frequent, cause of the pathological changes which have been described, is a theory which needs much stronger proof before it can be accepted. It is but fair to suppose, too, that other causes may influence this overgrowth. Excessive venery, over-indulgence in alcohol, masturbation, protracted indulgence in withdrawal, sexual excesses, perverted indulgences, horse-back riding, long-continued sedentary habits, constipation, and climatic exposures, all may be considered as possible contributing etiological factors.

The following are the reasons advanced by Ciechanowski (Crandon,⁶ *loc. cit.*, p. 843) for his belief in the correlation of gonorrhœa and the enlarged prostate.

- (1) The frequency of gonorrhœa;
- (2) The frequency of chronic gonorrhœa in the posterior urethra and prostate, *i.e.*, in 1070 cases the process was in the deep urethra in 424;
- (3) The frequency of cystitis; and, lastly,
- (4) The only domestic animal that suffers from enlarged prostate is the dog; and the male dog, too, seems to be the only animal that has a true purulent urethritis which is infectious.

Compare these reasons with the following histories and facts.

CASE I.—A gentleman, aged seventy-four years, was admitted to the hospital in August, 1903. First experienced difficulty in passing water at the age of fifty-two. Up to this time he states absolutely that he never had had intercourse with any woman. At the age of fifty-three he had intercourse with a woman for the first time. When he was fifty-four he began to use a catheter occasionally to empty his bladder. Married at age of fifty-six. His wife has borne him three children. Continued his marital relations to age of seventy-three. In his seventy-fourth year we removed a large, soft prostate weighing two ounces.

CASE II.—A gentleman, aged fifty-seven years. Always has lived a moderate life. Never used tobacco or alcohol. Denies absolutely gonorrhœa or any venereal disease. Never had inter-

course with any woman excepting his wife. Married at age of twenty-five years. Moderate indulgence in coitus. Is a very intelligent man, and had no reason to conceal anything. Prostatic and vesical calculus symptoms for four years. October, 1904, removed a prostate weighing 750 grains, after removal of multiple calculi from bladder.

CASE III.—A gentleman, aged sixty-six years; never had gonorrhœa or other venereal disease. Never had intercourse with any other woman than his wife. Never used tobacco or alcohol. Married at age of thirty-seven. Prostatic symptoms at age of sixty-two. Catheter life for four years; marked cystitis; by prostatectomy a moderately enlarged prostate weighing 300 grains removed.

Of our twenty-three cases, fourteen absolutely denied any venereal disease; four had in their earlier years suffered from gonorrhœa; and in the remaining five cases no history of gonorrhœa could be elicited at the time the history was taken, but they have not been asked since concerning it.

In this series of cases we have had to deal with men most of whom were far above the general average in regard to their habits, mental attainments, social standing, and education. If the history of cases is ever to be depended upon, it certainly seems fair to accept the statements of these men as truthful.

RÉSUMÉ.

1. Pathologically there are three types of prostates causing urinary obstruction: (a) The large, soft type, (b) the hard, small, contracted type, and (c) the mixed type.

2. Infection does not influence the variety of the pathological change.

3. The contracted form of prostate is not a secondary stage of the large, soft type of hypertrophied prostate, but is distinct from it.

4. In many cases of hypertrophy of the prostate there is present a true muscular hypertrophy.

5. In some of the atrophic cases the glandular elements

are relatively diminished and the muscular elements relatively increased.

6. Gonorrhœa is not an important etiological factor in the production of this disease, and there is no necessity for assuming it to be.

7. The theory of obstruction to the ducts causing passive dilatation of the glandular elements, as advanced by Ciechanowski and Crandon, does not satisfactorily explain the pathological findings.

8. Hypertrophy of the prostate results from glandular overgrowth, influenced by the degenerative changes of old age, and other agents which tend to produce the formation of fibrous connective tissue in an actively functioning gland.

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HAS THE CATHETER A PLACE IN THE TREATMENT OF CHRONIC PROSTATIC HYPERTROPHY?

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It is perhaps natural that the mind of a surgeon should deal with the important questions of the hour from the point of view which interests him most, and that the thinking and writing which he does should be approached from the direction of the "latest improvement" in the development of the problem at hand. This is certainly most strikingly shown by the tendencies of prostatic operating as reported at the medical societies and in the medical periodicals of the last few years. It is not so long ago that the younger surgeons of to-day cannot remember it, that the catheter was regarded as the main reliance of the surgeon for the relief of the discomforts and dangers of prostatic obstruction. It served the world long and faithfully, and now, if one can believe that the surgical literature of the day represents the beliefs of the representative men, it is carelessly thrown aside for procedures of a more radical kind. It is a still shorter time ago that Mr. Arthur McGill and his followers placed suprapubic prostatectomy within reach of the surgeon, and this procedure served the profession well and saved many lives. Now it, too, is being cast aside, with that same lack of care, for other and newer procedures of which there are still many things to learn. If one should arrange his methods of treatment from a summary of the current literature of prostatic operating for the last two or three years he must inevitably reach the conclusion that a perineal prostatectomy of some kind is to be performed on most of the cases which consult him. This condition of affairs is due to the great improvements in anæsthetic and operative technique during the last few years, and also to the greater

experience, and therefore increasing confidence, of surgeons. It is certainly and happily true that radical operations upon the prostate are slowly shouldering the catheter and other methods of palliative treatment aside, and are giving them a smaller and smaller field of usefulness. But there are many cases unfit to endure the shock of such radical procedures, and there are others (is it heresy to say so?) which are better off with proper palliation than with a radical operation. It would be a pleasant task to try to indicate some of the reasons why a suprapubic operation still has its field of usefulness, and why the Bottini procedure and other palliative operations may still be of the greatest value. Such a task is, however, outside the scope of these remarks, which shall confine themselves to an effort to point out some places where the catheter is still to be recommended and used.

Every surgeon is consulted by patients whose troublesome symptoms have developed so slowly and so quietly that they seek relief from the surgeon at a time when they are very old, infirm, and obviously bad surgical risks. They are in a condition when no man would think of advising an operation of any kind except for reasons of imperative necessity. This statement is made with all due recognition of the tremendous improvement in the methods of prostatic operating and of the greatly lessened mortality statistics as a result of such improvement. These cases may often be made comfortable for the rest of their lives by the daily use of the catheter, and if they are properly instructed in its use and are promptly cared for and supervised during the transition period through which they must pass on entering their catheter lives, they will not only remain comfortable, but will gradually acclimatize their bladders and kidneys to the encroachments of a catheter, and will continue living with a steadily diminishing risk from infections of a kind which threaten the integrity of those organs. So long as these conditions pertain such cases are properly palliated, and such catheter palliation should be continued. If such comfortable palliation ceases to be possible, the moment it ceases to be possible, the time for operative interference has come, even with the inevitable risks

which a formidable surgical procedure offers to the aged and infirm patient. Up to that time the catheter is useful, after that time its use becomes abuse, and the then inevitable operation should be performed before the continued abuse of the catheter has existed long enough, with its accompaniments of pain, loss of sleep and exhaustion, to markedly diminish the chances of its success.

There is another kind of case in marked contrast with the preceding in which the patient who seeks relief is comparatively young, vigorous, and seems in a more than usually favorable condition for enduring a radical operation. Yet this patient has a bladder, clean to be sure, but overdistended for so many months or years that it has reached a point of atonic degeneracy from which it may never recover. Such a patient, if operated upon in never so thorough a manner, will still possess his atonic bladder, which will necessitate the use of the catheter for its proper emptying, just as it did while its obstructing prostate was still untouched. One of the writer's early prostatectomies was such a patient, and the complete and successful removal of a large prostate left the patient in exactly the same condition that he was in before the operation. Another patient of this kind is under the writer's care at this moment. He is sixty years old, in excellent condition to bear an operation, and has a large, soft prostate which could be enucleated very easily, but he has an absolutely atonic bladder, so that three catheterizations in the twenty-four hours leave him absolutely free from all discomfort, and he goes eight hours after a catheterization without the smallest desire to urinate. At the end of that time from twelve to sixteen ounces of urine are removed, but he never passes a drop for himself. This patient is being carefully catheterized and watched in the hope of a betterment of this bladder atony which has existed for so long; but the writer is firmly convinced that a prostatectomy at the present time would leave him in a condition much less satisfactory than his present state of absolute catheter comfort. Such patients should use the catheter regularly and at such intervals as to prevent daily overdistention of the

bladder, until such time as the bladder shall rejuvenate itself to a degree which will enable it to empty itself, at least in large measure, after its obstruction is removed.

"There is still another class of cases which consult the surgeon early in the development of the obstructive conditions for symptoms which may seem to them trivial. Examination reveals a prostatic hypertrophy with some residual urine and a clean bladder. If the amount of retained urine is only an ounce or two, it is usually possible to palliate annoying symptoms, and it is surely unwise to resort to a routine use of the catheter. Such cases are often made comfortable for many years, or for their lives, by an occasional visit to the surgeon, and, although the time may come when what might be called a prophylactic prostatectomy will be done for such patients, that time has certainly not come yet, and we are no more justified in removing the prostate from such a case than we should be in removing the appendix from a patient who had experienced one mild and doubtful attack of appendicitis.

"If, on the other hand, the obstructive conditions have progressed a little farther and the amount of residual urine exceeds three or four ounces (and it may be very large), it becomes evident that the continuance of the existing conditions is impossible, and the patient must either be taught to empty the bladder one or more times daily, according to the amount of retained urine, or that some operation for the removal of the obstructing masses must be performed. Many such patients are ignorant, poor, and live amidst a set of conditions which render surgical cleanliness next to impossible and unattainable. These patients should be operated upon at once, while the bladder is still clean, and while all the conditions are most favorable, rather than take the almost certain chance of severe and persistent vesical infection and its attending dangers. Other such patients are intelligent, cleanly in their habits, and live with a set of conditions which makes anything possible. These are the cases over which most difference of opinion exists. They must have either a routine catheter life or an operation. If the former, they are taking chances of an infection

of the bladder and kidneys which is almost certain to come sooner or later. If the latter, they are face to face with a formidable operation and a 5 per cent. mortality.

"The writer believes that the catheter still has a field of usefulness in such cases, many of which need a catheter only once or twice a day, and are kept in perfect comfort by its proper use. Of course, more or less severe infection of the bladder occurs sooner or later in most prostatics who are leading a catheter life; but it is the writer's experience that, in the class of patients of which we are speaking, most of these infections quickly quiet down and leave behind them an acid urine with, at the most, a thin cloudiness as its only departure from normal standards. It is the writer's custom to have long talks with such patients, to explain the conditions as carefully as possible, and to offer a choice of the two methods of procedure, but also to offer definite advice in favor of the catheter as the best treatment for the immediate future. This means that all but a few patients embark on such a catheter life, and continue under it until it becomes difficult and therefore unsafe, or until it proves so irritating that pain and frequency of urination render its future utility doubtful. This time may never come or it may come very soon. When it does come, and as soon as it does come, the time for catheter palliation has passed, and the time for operation has come." *

These, then, are some of the indications for the more or less permanent use of the catheter. The writer firmly believes that while many of the miserable men who were formerly dragging out a painful existence with the aid of the catheter, because there was no alternative to offer them, are now well and happy after a properly performed prostatectomy or other less radical procedure, others who were then made comfortable and content by the daily use of the catheter may still be made so by its aid. The fact that we have several new strings to our bow does not mean that the old one is worthless and must be thrown away.

* Quoted from the writer's paper in the Colorado Medical Journal for July, 1904.

PROSTATISM WITHOUT ENLARGEMENT OF THE PROSTATE.¹

ITS DIAGNOSIS AND TREATMENT.

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PROSTATISM is commonly understood to signify a train of symptoms accompanying that blight of declining years,—senile hypertrophy of the prostate. That this same train of symptoms is encountered independent of prostatic enlargement there can be no question; and it is for the purpose of calling attention to the condition most notable in producing prostatism without enlargement of the prostate that this brief communication is presented.

The particular train of symptoms embraced in the above title consists of urgency and frequency of urination, pain during and after the act, and partial or complete retention of urine. When met in an individual past the age of fifty, this collection of symptoms—if there be no marked increase of urinary frequency or vesical hæmaturia during the muscular activity of the day to indicate the presence of neoplastic growth or stone in the bladder—is more likely to suggest to the mind of the ordinary medical observer prostatic hypertrophy than the malady I am about to describe.

This morbid condition, which is so common a cause in the production of the symptoms of prostatism, is best expressed under the title of "Contracture of the Neck of the Bladder." It has been described by earlier authors under different names, resulting in an imperfect understanding of the nature of the malady.

In a communication delivered before the American Association of Genito-Urinary Surgeons, May 2, 1901, I have en-

¹ Read before the Medical Society of the State of New York, February 1, 1905.

deavored to collect the multiplicity of titles variously applied to this condition under the one employed for a long time by my honored colleague, Dr. Keyes.

Contracture of the neck of the bladder is, in substance, a fibroid stenosis of the vesical orifice. It is not a hyperplasia of the muscular elements of the sphincter or of the adenomatous tissue; it is not a simple spasm or a mucous fold, but a fibrous infiltration inflammatory in character.

Its cause may be found in previous chronic inflammation of long standing in front of or behind the sphincter vesicæ. Such inflammation may or may not be gonorrhœal in type. As its existence depends upon an inflammation either of high intensity or of protracted duration, it is more frequently of gonorrhœal origin.

It may occur in the young as well as in the aged, and is found alone during the mature stage of prostatic hypertrophy; or it may coexist with this latter condition, when it is often the real cause of the associated symptoms. In other words, we may have an enlarged prostate of such dimensions as to leave no doubt of the existence of such a growth; and yet there may be no symptoms accompanying the enlargement, unless there is a coexistent contracture of the neck of the bladder, or unless the prostate itself is directly obstructive to the vesical outlet. Sir Henry Thompson recognized this fact, and in an article written in 1883 refers to obstruction of the bladder outlet, which occurs with and without coexistent prostatic hypertrophy.

That there is confusion in the minds of many operators and writers, even at the present day, between contracture of the neck of the bladder and prostatic hypertrophy is evidenced by a glance at the current literature of this and foreign countries, which is sufficient to justify an attempt to assist at clearing up the situation by calling attention to the diagnostic features and clinical cases bearing upon this question.

M. Lemeau, in a communication to the *Annales des Org. Urin.*, November 15, 1904, calls attention to what he terms an interesting case of error in diagnosis.

The patient was an extremely feeble old man, affected with acute retention of urine. Rectal examination revealed an enormous tumor, and a diagnosis of neoplasm was made. Upon opening the bladder suprapubically, it was revealed that the tumor was due to vesical distention with urine, there being entire absence of any tumor or prostatic enlargement. Obliteration of the urinary orifice was almost complete by what the author described as "simple spasm;" but it was undoubtedly an example of the condition now under consideration. The patient succumbed to that secondary state so often produced after prolonged prostatism,—namely, pyelonephritis.

Another case was reported in the same issue by MM. Reynes and Montfort. A patient seventy-eight years old was sent to the hospital with a diagnosis of prostatic hypertrophy. Upon rectal examination, no notable enlargement of the prostate gland could be distinguished. There existed, however, the usual symptoms of prostatism,—dysuria, incomplete retention of urine, etc.,—requiring the patient to rely entirely upon the catheter for six months previous. A suprapubic opening was made; no hypertrophy of the gland was found, but, as expressed by the writer, a sclerosis of the vesical outlet.

In another issue of the same publication, Dr. Moran, of Brest, contributes a note on a case of prostatism without a prostate. The history of the patient was the subject of this communication, and the progress, symptoms, and results of two operative interferences composed a detailed report. The patient was sixty-five years of age, and for one year previously had complained of all the symptoms common to prostatism. In early years he had suffered from urethritis, and the symptoms had become much aggravated several weeks previous to his examination. A No. 20 Charrière sound was introduced through the urethra without difficulty, meeting a slight resistance on reaching the vesical sphincter. On rectal examination, slight enlargement of the prostate was revealed. There was residual urine to the amount of 300 grammes. The diagnosis of hypertrophy of the prostate—probably of the middle lobe—was made. Operation was suggested, but refused. The patient did not improve under bladder lavage, and was finally induced to submit to surgical interference, which consisted in a Bottini-Freudenberg galvanocautic operation. By this time the retention had become complete, vol-

untary urination being impossible. As only partial improvement was thus obtained, exploration through a suprapubic incision was determined upon a month later, when, encircling the neck of the bladder, was found a fibrous ring which had not been completely severed by the Bottini operation. It was then incised through the suprapubic opening by means of a thermocautery.

The result of this second operation was excellent. The urine became clear and free of inflammatory elements, and the residual urine diminished from 300 to from ten to thirty grammes.

The author summarizes this observation—which was a most interesting one—as a case, relatively rare, of prostatism without the prostate, due to a sclerotic formation of the vesical neck, sufficient to obstruct the outflow and interfere with the efforts of the bladder to evacuate itself; and, after section of the obstruction, a return of the bladder to complete functional activity.

Many other cases of similar character might be mentioned in support of the statement that contracture of the neck of the bladder is a more frequent cause for the symptoms designated than is generally recognized; that it is often confounded with hypertrophy of the prostate, and that its existence should always be considered in a differential diagnosis.

As may be seen from the accompanying cut (Fig. 1), taken from a cast of the natural subject, the normal vesical orifice is of sufficient dimensions to freely admit the entrance of the finger; whereas, when it is the seat of contracture, it may be so stenosed as to just barely admit the finger-tip, or to be almost completely occluded.

The second illustration (Fig. 2) is taken from a post-mortem subject, and is a fair example of this obstructive condition. Its recognition during life is not difficult. When existing independent of prostatic hypertrophy, rectal touch will reveal a normal gland; and measurement of the urethral length, one within the normal limits, namely, seven and three-quarters to eight and one-quarter inches. The catheter may yield little or no residual urine when the bladder's compen-



FIG. 1.—Section showing normal vesical orifice and prostate.

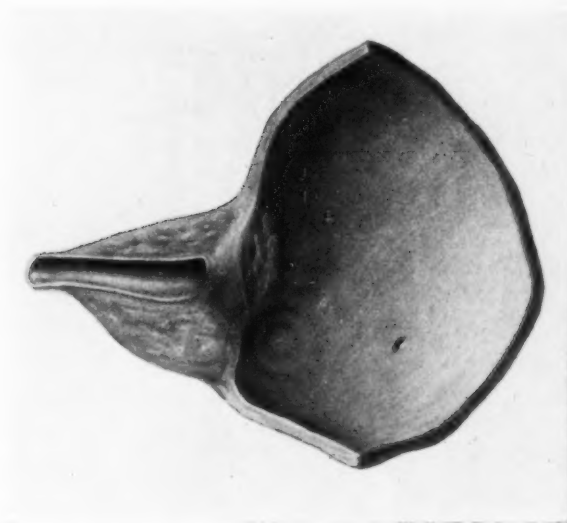
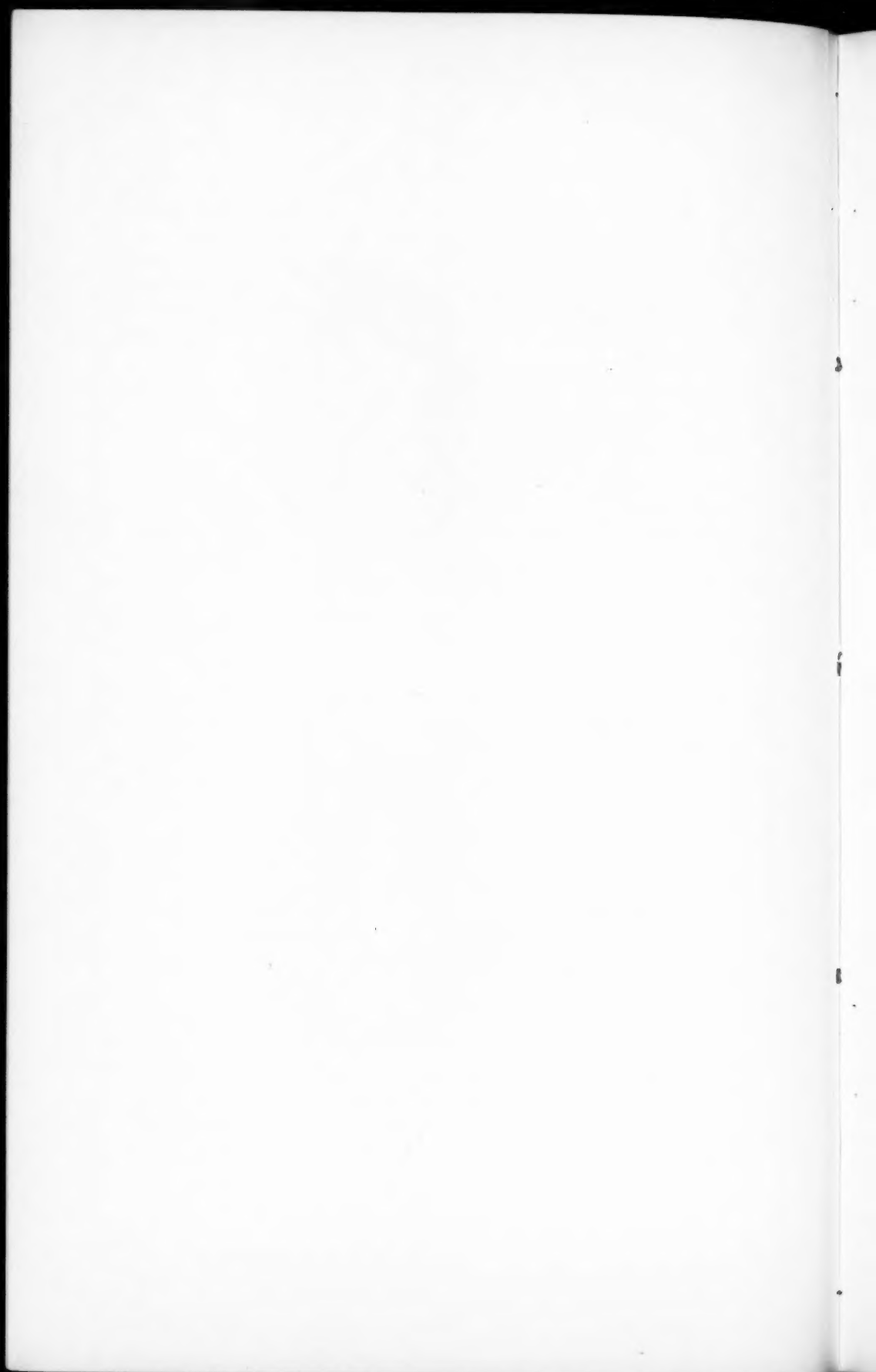


FIG. 2.—Section showing contracture of neck of bladder. Normal prostate.



satory power is sufficient to overcome the obstruction (Cases 8, 10, 16, 23, and 26). Later on, however, when this compensatory power fails, or when the obstruction is valve-like or complete, residual urine will exist, from one ounce (incomplete retention) up to the full capacity of the bladder (complete retention); and, when this point is reached, we will often meet with that symptom so common in old prostatics,—pseudo-incontinence of urine or urinary overflow. Before infection occurs the urine may be limpid and clear, but after cystitis supervenes all the symptoms peculiar to it will be in evidence.

Generally speaking, it may be stated that contracture of the neck of the bladder is the causative factor of complete or incomplete retention of urine in a patient presenting a normal urethral length and a prostate normal to rectal touch, in the absence of tabes or other central lesion.

A Thompson searcher introduced through the urethra may enter without difficulty, or may meet obstruction at the vesical sphincter. The absence of prostatic intravesicular growth to account for the symptoms of obstruction will be noted; whereas the orificial contraction will be recognized by turning the beak of the instrument towards the *bas fond*, making gentle traction while rotating it from side to side. A full-sized steel sound may enter the vesical orifice without marked difficulty, as this is the most distensible part of the canal, and moderate contracture may not be detected by the passage of a sound.

Finally, this diagnosis may be conclusively confirmed when, through a suprapubic incision, with one finger in the bladder and another in the rectum, total absence of prostatic obstruction is found to account for the existing retention of urine; or, when a perineal incision is made, and the finger—when passed through the membranous urethra and the prostatic urethra—reaches the neck of the bladder and meets an impassable orifice so tight as to just admit the end of the finger or completely to obstruct its entrance.

Beyond doubt, many cases of prostatic hypertrophy which have been operated upon with a view to removal of the hyper-

trophied gland without recognizing the existence of contracture of the vesical orifice result in failure to relieve the symptoms dependent upon the obstruction.

In the third cut (Fig. 3) is pictured a case of prostatic hypertrophy, in which, however, the obstruction at the vesical outlet is due not so much to the enlargement of the gland as to the constricted or contracted orifice. Failure to recognize this fact during operation would undoubtedly interfere with a successful result. The same condition may coexist with stone in the bladder, and failure to detect and remedy it will also result in a continuation of the symptoms, as the following case illustrates.

The patient, sixty-two years old, suffered from complete retention of urine in January, 1890, and had been dependent upon the catheter for several years. The bladder was suprapubically entered and two stones the size of horse-chestnuts removed from the *bas fond*, and an encysted third stone in the region of the ureter, there being no intravesical enlargement of the prostate. The operation was completed by the removal of the stones. The patient made a good recovery; but the complete retention was in no way affected by the operation, and he continued the use of the catheter for twelve years longer, when he consulted my colleague, Dr. Keyes, Jr., who recognized the presence of contracture of the neck of the bladder, and submitted him to the operation of perineal-galvano-prostatectomy. At this time his prostate was again found to be perfectly normal, the entire obstruction being due to the stricture or contracture at the bladder neck.

The patient was out of bed on the seventh and left the hospital on the eleventh day. Voluntary urination returned, and he was able to empty the bladder to within one ounce.

The presence of contracture of the neck of the bladder being determined, the most effective means for its relief is of next importance. To be of sufficient utility, simple incision of the obstructing ring is likely to be attended with very severe hæmorrhage; and it must be overdone to insure against the return of the condition in the process of healing.

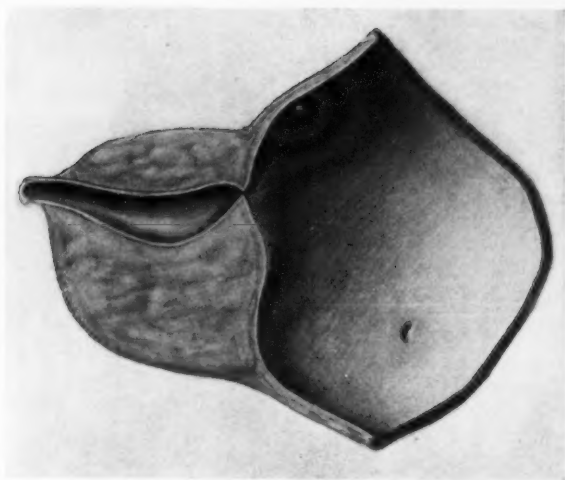


FIG. 3.—Contracture of neck of bladder, with enlargement of prostate.

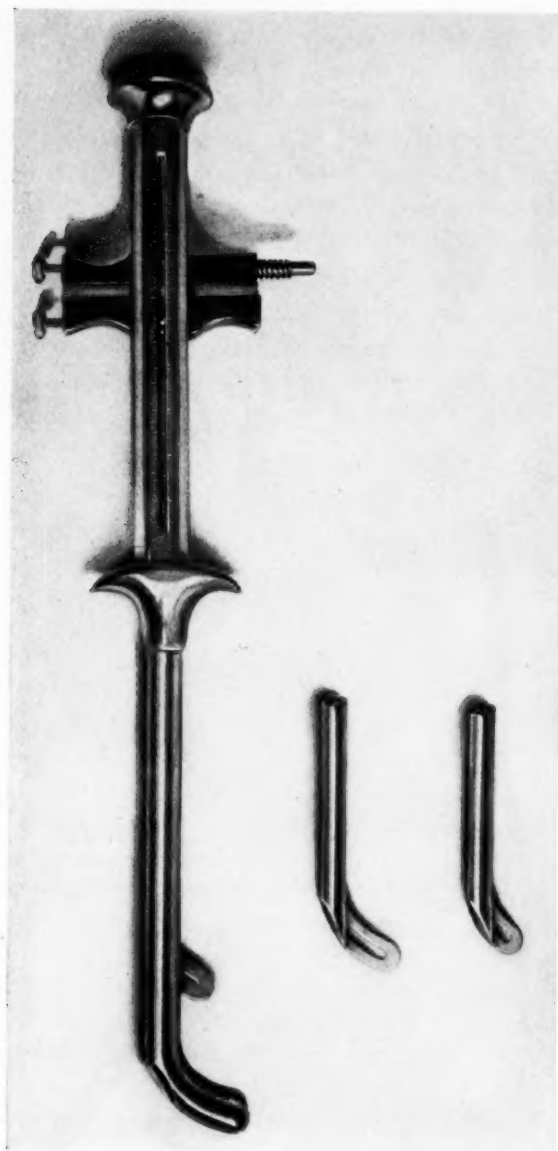


FIG. 4.—Chetwood galvanocautery prostatic incisor for use through a perineal opening.

The method adopted in all of the cases tabulated in this report is the writer's technique of galvano-prostatotomy through a perineal opening.

The galvanocautery incision is safe, bloodless, and effective. The instrument which I have had designed for this purpose (Fig. 4) is used through a simple perineal incision. The perineal opening is a means of exploration as well as of drainage,—a surgical advantage which needs no comment here.

The experience derived from these thirty-six cases would seem to justify the conclusions that contracture of the neck of the bladder is a common cause for vesical obstruction; that its relief is safe and sure by means of a galvano-prostatotomy through a perineal opening; and, finally, that it is often an explanation for what has been termed "Prostatism without enlargement of the prostate."

TABULATED REPORT OF THIRTY-SIX OPERATED CASES.

No.	Date.	Age.	Previous urethritis.	Urination: day.	Urination: night.	Residuum.	Other symptoms or complications.	Duration.	Previous condition.	General condition.	Urethral length.	Prostate.	Kidney complications.	Operation.	POSTOPERATIVE CONDITIONS.				Result.
															Urination: day.	Urination: night.	Residuum.	Last report.	
1	Aug. 7, 1900	73	Yes	Incontinence	Incontinence	1 oz.	Suprapubic fistula	Several years	Chronic cystitis	Good	Normal	Not enlarged	No	Sept. 1900	Q. 2 to 3 h.	Q. 2 to 3 h.	None	Feb. 10, 1902	Improved; bladder empties; urinary frequency, and incontinence less.
2	Sept. 10, 1900	71	No	Catheter	Catheter	C. R.*	Stone	8 mos.	Chronic cystitis	Good	Normal	Not enlarged	Yes	July 28, 1901	Q. 3 to 5 h.	Q. 3 to 5 h.	3 oz.	14 mos. after operation	Improved; voluntary urination returned.
3	Oct., 1900	45	Yes	Q. 1 h.	6 times	1/2 oz.	Dribbling	Many years	Chronic urethritis	Fair	Normal	Not enlarged	Yes	Nov. 20, 1900	Q. 4 to 5 h.	Once	None	Jan., 1905	Cured; no residuum; dribbling less; kidney normal.
4	Dec. 15, 1900	33	Yes	Q. 1/4 h.	Q. 1/4 h.	1/2 oz.	Hæmaturia; tuberculous cystitis	Several years	Chronic tuberculous cystitis	Poor	Normal	Nodular	Yes	Dec. 18, 1900	Q. 1/2 to 3/4 h.	Q. 1/2 to 3/4 h.	None	June, 1905	Unimproved; tuberculous condition progressively worse.
5	Dec. 17, 1900	69	...	Q. 20 min.	Q. 20 min.	1 oz.	Hæmaturia; intense pain; family tuberculous	Several years	Chronic cystitis	Fair	Normal	Not enlarged	No	March, 1901	Q. 2 to 3 h.	2 to 3 times	None	March, 1903	Much improved; no pain and less frequency.
6	Jan. 1, 1901	45	Yes	Q. 1 h.	Q. 1 h.	2 oz.	Hæmaturia; intense pain; diabetes	4 years	Chronic urethro-cystitis	Poor	Normal	Not enlarged	No	Jan. 10, 1901	Q. 3 to 4 h.	Once	None	2 years after operation	Improved; pain relieved; bladder empties.
7	Jan. 8, 1901	33	Yes	Q. 1 h.	7 times	2 1/4 oz.	Prostatic abscess	6 years	Chronic prostatic abscess	Good	Normal	Acute suppuration	No	Jan. 14, 1901	Q. 3 to 4 h.	Q. 3 to 4 h.	None	1 mo. after operation	Cured; normal bladder drainage.
8	Jan. 10, 1901	31	.....	Q. 1/4 to 1/2 h.	Q. 1/4 to 1/2 h.	.....	Great dysuria; hæmaturia	Several years	Acute and chronic cystitis	General tuberculous	Normal	Not enlarged	No	Jan. 12, 1901	Q. 1/2 to 3/4 h.	Q. 1 h.	None	2 wks. after operation	Improved as to urination and much less pain.
9	Jan. 21, 1901	29	Yes	Q. 1 to 2 h.	3 to 5 times	2 oz.	Great dysuria	Several years	Chronic prostatic abscess	Good	Normal	Not enlarged	No	Jan. 22, 1901	Q. 3 to 5 h.	Once or not at all	None	2 mos. after operation	Cured; normal bladder drainage.
10	Jan. 25, 1901	39	Yes	Q. 2 to 3 h.	2 to 3 times	None	Acute relapses of cystitis	15 years	Acute and chronic cystitis	Good	Normal	Not enlarged	No	Jan. 29, 1901	Q. 3 h.	Once or twice	None	Dec. 4, 1902	Improved; urination freer and less painful.
11	Jan. 31, 1901	46	No	Q. 1 h.	Q. 1 h.	to oz.	Great dysuria	10 years	Chronic incomplete retention	Good	Normal	Not enlarged	No	Feb. 5, 1901	Q. 3 to 5 h.	Not at all	None	2 years after operation	Cured; no residuum or teroperation pain.

* Complete retention

12 Feb. 14, 1901	39	No	Q. $\frac{3}{4}$ to 2 h.	1½ oz.	Dysuria	Several years	Chronic cystitis	Good	Normal	Not enlarged	No	Feb. 15, 1901	Q. 4 to 6 h.	Q. 4 to 6 h.	None	Oct. 14, 1902	Cured; bladder drainage complete; no pain.
13 Oct., 1901	63	.....	Q. $\frac{1}{2}$ h.	4 oz.	General tuberculous	5 or 6 years	Chronic cystitis	Poor	Normal	Not enlarged	No	Oct. 26, 1901	Q. 2 to 3 h.	Q. 2 to 3 h.	None	Dies from general tuberculosis 2 yrs. after operation	
14 Oct., 1901	42	Yes	Q. 2 to 3 h.	2 oz.	.....	Several years	Chronic prostatic urethritis	Good	Normal	Inflamed	No	Oct., 1901	Q. 6 h.	Q. 6 h.	None	1 year after operation	
15 Nov. 16, 1901	27	Yes	Q. 1 h.	½ oz.	Constant pain	18 mos.	Chronic cystitis	Good	Normal	Somewhat swollen	No	Dec. 3, 1901	Im-proved	Im-proved	None	4 mos. after operation	
16 Dec. 1, 1901	41	Yes	Q. 2 to 3 h.	None	Perineal pain	2 years	Chronic prostatic urethritis and cystitis	Good	Normal	Enlarged	No	Jan. 28, 1902	Normal	Normal	None	1 year after operation	
17 Apr. 26, 1902	57	Yes	Q. 1 to 1½ h.	Al-most C. R.	Toxæmia	Several years	Chronic cystitis	Bad	Normal	Not enlarged	Yes	Apr. 27, 1902	Q. 3 to 5 h.	Q. 3 to 5 h.	5 drs.	Nov. 25, 1904	Cystitis cured; improvement as to urination; no pain. Cured as to bladder; kidney condition continues.
18 May 30, 1902	65	.....	.....	C. R.	Hæmaturia	3 years	Chronic cystitis	Good	.....	Enlarged	No	June 3, 1902	Q. 4 to 6 h.	Q. 4 to 6 h.	None	3 wks. after operation	Cured; bladder empties; urination normal.
19 Oct. 22, 1902	72	.....	Q. 3 h.	3 oz.	.....	5 years	Chronic cystitis	Good	Normal	Enlarged	No	Oct. 28, 1902	Q. 6 h.	Q. 6 h.	None	8 mos. after operation	Cured; bladder drainage satisfactory.
20 Nov., 1902	74	Yes	.....	C. R.	Periurethral abscess	12 to 15 years	Chronic cystitis; stone	Fairly good	Normal	Not enlarged	Yes	Nov. 11, 1902	Q. 4 to 6 h.	Q. 4 to 6 h.	1 oz.	2 years after operation	Cured as to bladder condition; kidney implication persists.
21 Nov., 1902	72	.....	.....	C. R.	Stone	3 years	Chronic cystitis	.....	Normal	Not enlarged	No	Nov., 1902	.....	.....	C. R.	2 mos. after operation	Unimproved as to bladder condition; pain relieved. Cured.
22 Dec., 1902	51	Yes	Acute cystitis	2 oz.	Dysuria; tenesmus	3 mos.	Prostatic abscess	Good	Normal	Slightly enlarged	No	Dec., 1902	Normal	Normal	None	8 wks. after operation	Cured.
23 Jan. 10, 1903	35	Yes	Q. 3 to 4 h.	None	Intense epipubic pain	Several years	Chronic urethritis	Good	Normal	Not enlarged	No	Jan. 20, 1903	Normal	Normal	None	1 mo. after operation	Cured; pain relieved; urination normal.
24 Jan. 30, 1903	40	Yes	.....	C. R.	Hæmaturia	3 years	Chronic urethritis; stricture	Good	Normal	Not enlarged	No	Jan. 30, 1903	Normal	Normal	None	3 mos. after operation	Cured; bladder drainage complete.
25 Feb. 10, 1903	64	.....	Q. $\frac{1}{2}$ to 2 h.	½ oz.	Severe priapism	Several years	Chronic cystitis	Good	Normal	Enlarged	Yes	Dec. 7, 1904	Q. 2 to 4 h.	Q. 2 to 4 h.	None	1 mo. after operation	Cured.

* Complete retention.

TABULATED REPORT OF THIRTY-SIX OPERATED CASES.

No.	Date.	Age.	Previous urethritis.	Urination : day.	Urination : night.	Residuum.	Other symptoms or complications.	Duration.	Previous condition.	General condition.	Urethral length.	Prostate.	Kidney implication.	Operation.	POSTOPERATIVE CONDITIONS.				Result.
															Urination : day.	Urination : night.	Residuum.	Last report.	
26	July 23, 1903	66	.....	Q. 1 to 3 h.	2 to 3 times	None	Precipancy of urination	7 years	Chronic cystitis	Good	Normal	Not enlarged	No	July, 1903	Q. 4 h.	Once	None	1 year after operation	Cured: subjective symptoms relieved.
27	Aug. 15, 1903	45	Yes	Q. 1 h.	2 times	4 oz.	.....	2 years	Chronic cystitis	Good	Normal	Normal	No	Aug. 21, 1903	Normal	Normal	None	1 year after operation	Cured: bladder drainage satisfactory.
28	Nov. 25, 1903	57	.....	Q. 1 h.	6 to 7 times	4 to 5 oz.	Dysuria	18 mos.	Chronic cystitis	Fair	Normal	Not enlarged	Yes	Dec. 12, 1903	Q. 4 h.	Q. 6 h.	None	1 year after operation	Cured as to bladder; kidney implications continue.
29	Jan. 30, 1904	39	Yes	Q. 3 to 4 h.	3 to 5 times	4 oz.	Dysuria	Several years	Relapsing urethritis and prostatic abscess	Good	Normal	Not enlarged	No	June 29, 1904	Normal	Not at all	None	Dec., 1905	Cured: urination normal; no pain.
30	Feb. 15, 1904	65	No	Q. 1 h.	Q. 1 h.	4 oz.	Stone	Several years	Stone and prostatic abscess	Fair	Normal	Somewhat enlarged	Yes	Apr. 25, 1904	Q. 2 to 4 h.	Q. 2 to 4 h.	None	1 year after operation	Cured: bladder drainage normal.
31	Mch. 11, 1904	43	Yes	Q. 1 to 1½ h.	Q. 1 to 1½ h.	5½ oz.	.....	Several years	Chronic cystitis	Good	Normal	Not enlarged	No	Mch. 12, 1904	Normal	Not at all	None	Feb., 1905	Cured: bladder drainage satisfactory.
32	Apr. 13, 1904	59	Yes	Q. 3 to 4 h.	Q. 10 m. to 1 h.	5 to 8 oz.	Intense dysuria; morphinism	Several years	Chronic cystitis	Bad	Normal	Not enlarged	No	Apr. 23, 1904	.....	.....	.....	.....	Patient dies 21 days after operation from gradually increasing renal insufficiency.
33	Apr. 25, 1904	60	Yes	Q. 2 to 4 h.	Once	5 oz.	Ataxia	8 years	Chronic cystitis	Good	8¾ ins.	Slightly enlarged	No	July 1, 1904	Q. 6 h.	Once	None	6 mos. after operation	Improved as to bladder drainage.
34	May 2, 1904	46	Yes	Q. 30 m.	Incontinence	4 oz.	.....	Several years	Chronic cystitis	Good	Normal	Not enlarged	No	May 13, 1904	Q. 1½ h.	Some incontinence	None	June 4, 1904	Improved: urination less frequent and less dribbling.
35	Nov., 1904	66	Yes	Smallest quantity frequently	Smallest quantity frequently	Almost none	Difficult urination and great dysuria	Several years	Chronic urethritis and cystitis	Poor	Normal	Not enlarged	Yes	Nov., 1904	Q. 6 h.	Q. 6 h.	None	6 wks. after operation	Cured: voluntary urination returned.
36	Jan. 9, 1905	66	Yes	.....	.....	C. R.	.....	10 years	Stricture; chronic cystitis	Good	Normal	Slightly enlarged	No	Jan. 9, 1905	Q. 4 h.	Q. 4 h.	2 ozs.	4 wks. after operation	Cured: voluntary urination returned.

* Complete retention.

SOME ANATOMICAL POINTS CONNECTED WITH THE PERFORMANCE OF PROSTATECTOMY.¹

WITH REMARKS UPON THE OPERATIVE TREATMENT OF PROSTATIC
HYPERTROPHY.

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As an introduction to the present paper, I desire to pay a brief tribute to a distinguished member of the Medical Society of the State of New York, whose valuable contributions to the subject under discussion may be appropriately recalled.

I refer to Dr. Gouley, of New York, who occupies a peculiarly important position in the history of the evolution of the operative treatment of prostatic hypertrophy. Dr. Gouley was one of the only two surgeons to whom it may be said that we owe the transmission and the keeping alive of the operative treatment of this disease from the time at which its originator, the distinguished French surgeon Mercier, left the field, to that at which it entered upon its modern period, approximately the interval between 1865 and 1886, the other being Bottini. For the first ten years or so Dr. Gouley was the solitary one to observe in any systematic sense, and to appreciate the possibilities of, the operative treatment. The insistent advocacy of Bottini for the modification of Mercier's operation which he introduced did much to strengthen the position of Gouley, and though it was many years before either of their procedures received adherents, yet their service was not a slight one. But it is more especially to the particular

¹ Read before the Medical Society of the State of New York, February 1, 1905.

contribution of Gouley that I wish to call attention; for, among the large number of those who have all at once in the course of the last few years so enthusiastically taken up prostatectomy, and especially perineal prostatectomy, few if any seem to be aware of the fact that perineal total prostatectomy was originally and definitely proposed by Gouley. This is, however, the fact, for he clearly describes that operation in a publication in 1873. The method has since been put forward by or attributed incorrectly to various surgeons in ignorance of this fact, just as we have seen, with less excuse, the same thing done with reference to certain of the old time classic perineal incisions which have been applied to the performance of prostatectomy, but which differ in nowise from the original form in which they were used for perineal lithotomy. I mean the inverted V and the inverted Y, which go back I do not know how far, but which were in common use in the middle of the last century, and the curved prerectal incision, so-called Zuckerkandl incision, which of course dates back 2000 years at any rate, it being the universally known incision of Celsus when cutting "on the gripe."

Gouley's operation is that of the rapid finger enucleation done through the sides of the prostatic urethra by the forefinger tip introduced into the latter through an ordinary external perineal urethrotomy incision. It is the operation which I have practised from time to time since 1889, having learned it from the verbal instructions of Dr. Gouley in 1884. It is the method which I still prefer. It is identical with the operation employed by Goodfellow, of San Francisco, who, not knowing Gouley's description, assumed it to be original with himself, and it is that practised by several others under a similar belief with regard to themselves. It emanates from Gouley, and I am glad to have the opportunity to say this, and to acknowledge, at the same time, my own sense of indebtedness to him for having originally directed my attention to the importance of the operative treatment and to its future possibilities.

In the remainder of this paper I would like to speak of

a few of the anatomical points which have a more especial bearing upon the performance of perineal prostatectomy.

Fig. 1 depicts a three-lobed hypertrophy of the prostate. The gland, together with its envelopes, has been cut away from the bladder, and its anterior commissure has been divided by an incision extending into the prostatic urethra in order to expose the interior of the latter throughout, and to give a view of the relations of the median and lateral enlargements to it. The points which are here demonstrable are as follows:

1. The completeness of the tumor formation in each of the three lobes, and the fact that they are definitely separable from the outer or fibrous sheath which encloses the gland.
2. The thickness of the outer sheath, which in some cases, as here, is conspicuous.
3. The well-marked interval or space (*f*) between the surface of the gland and the inner aspect of the outer sheath. It is in this space that all enucleations of the gland should be conducted. The above features are by no means always so clearly defined as they are in this specimen.
4. It also shows that the level of the lower border of the urethral aspect of each lateral lobe is a little above that of the floor of the prostatic urethra, consequently, also above the level of the ejaculatory ducts. Any operation, therefore, which does not involve injury to the floor of the prostatic urethra will not injure the ducts.
5. In this case the tumor formation of the middle lobe is, strictly speaking, outside the urethra and intravesical; it is therefore also outside the sphere occupied by the ducts, and its removal need not implicate the latter in its performance.

The enucleation without injury of the ducts is, theoretically at least, possible. How frequently it actually spares them, it is difficult to say. I shall show later that it is possible to preserve them when performing the operation according to the method of Gouley, contrary to what has been implied in a recent discussion, by Dr. Young, who characterized the rapid finger enucleation as a blind procedure done in the dark, and a rough tearing out of the gland which disregarded injury to

the ducts. In a specimen obtained from a fatal case, in which five days before death I had enucleated the prostate by the method of Gouley, and had not given any attention to the preservation of the ducts, and which I had the opportunity to examine thoroughly post-mortem, I discovered to my surprise the ejaculatory ducts quite intact except just at their point of emergence on the urethral floor, where the verumontanum had been injured, and with it just the terminal parts of the ducts (this is illustrated in Fig. 11).

That the ducts may be preserved in the performance of the finger enucleation is further evidenced by the statements of Goodfellow, who reports the occurrence of apparently natural ejaculation in a considerable number of the patients operated upon by him, and by similar assertions on the part of some of the English operators in connection with the suprapubic operation; the actual figures have not, so far as I am aware, been given with regard to this point, but the statements are sufficiently explicit to indicate that the criticism of Gouley's operation or the claim for the superiority of one or another special technique in this respect are not well grounded. Since I have referred to this matter, I would add that the criticism with regard to the blindness of procedure of finger enucleation does not seem to me to hold good as a general statement, at any rate. That it is true for individuals I readily agree, but for those of us who practise it, the sense of touch is more accurate, delicate, and a safer guide than that of sight in the performance of this operation. The ability to *see* the steps of the operation I have not yet been able to acquire in the few cases in which I have endeavored to follow Dr. Young's manner of operating, because of the presence of blood and the fact that I have not succeeded in bringing into view the upper and more distant aspects of the gland during the enucleation. This, however, I readily acknowledge is very likely owing to my lack of familiarity with the method, and to being obliged to wean myself from another method of operating with which I have been familiar for many years. What I wish especially to make clear is that far too much attention has been

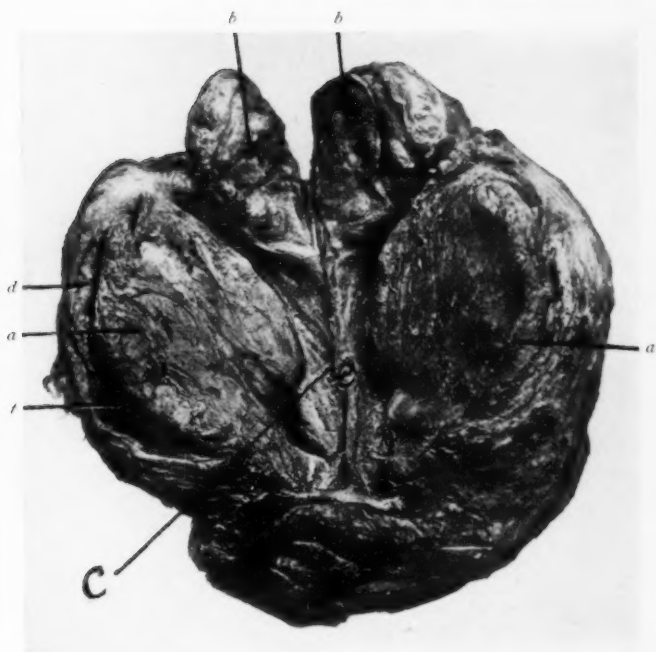


FIG. 1.—Three-lobed hypertrophy. The gland and its outer sheath have been cut away from the bladder above and the anterior urethra below. The gland has been divided longitudinally through its anterior commissure and spread open to expose the interior of the prostatic urethra. The middle lobe has been divided in the median line to its base.

(*a-a*) The two lateral lobes. (*b-b*) The two halves of the divided middle lobe. (*c*) The prostatic urethral floor. (*d*) Outer aspect of the external fibrous sheath. (*e*) Orifices of the ejaculatory ducts. (*f*) The space between the gland and its external fibrous sheath. (Watson.)

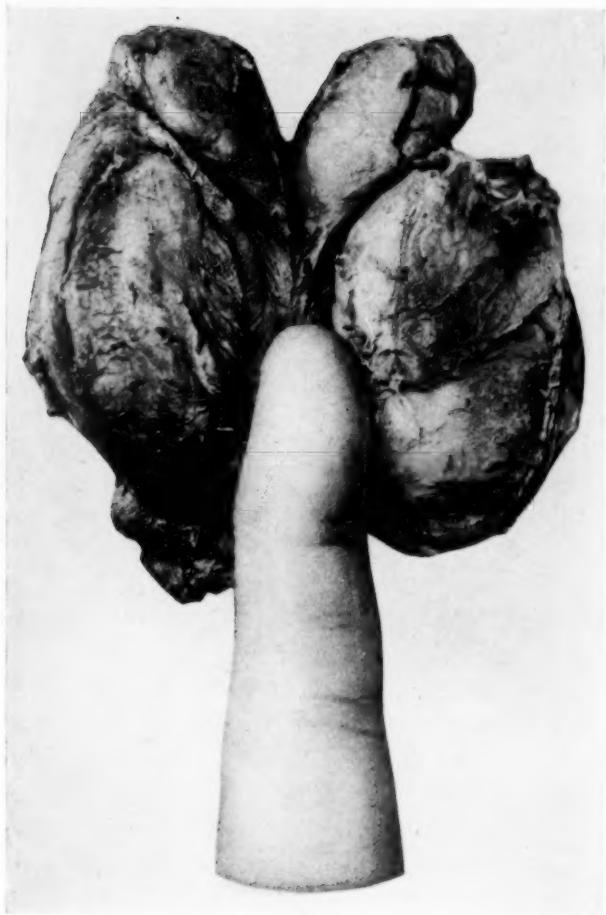


FIG. 2.—Finger enucleation in the manner proposed by Gouley. The enucleation, as the author usually begins it. Floor of prostatic urethra not injured necessarily. (Watson.)

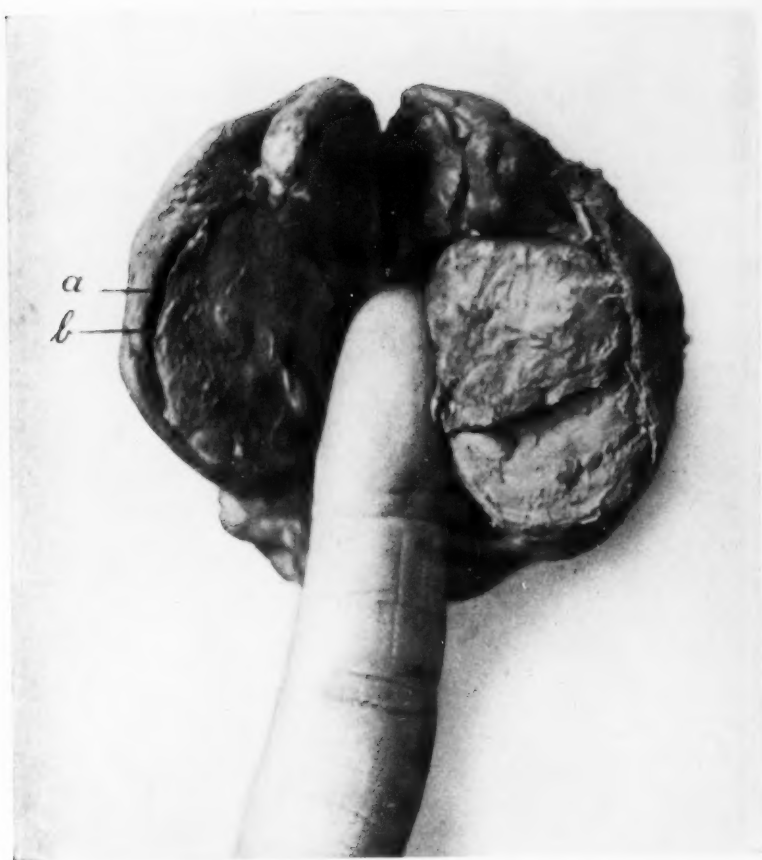


FIG. 3.—Enucleation a little further advanced. (Watson.)

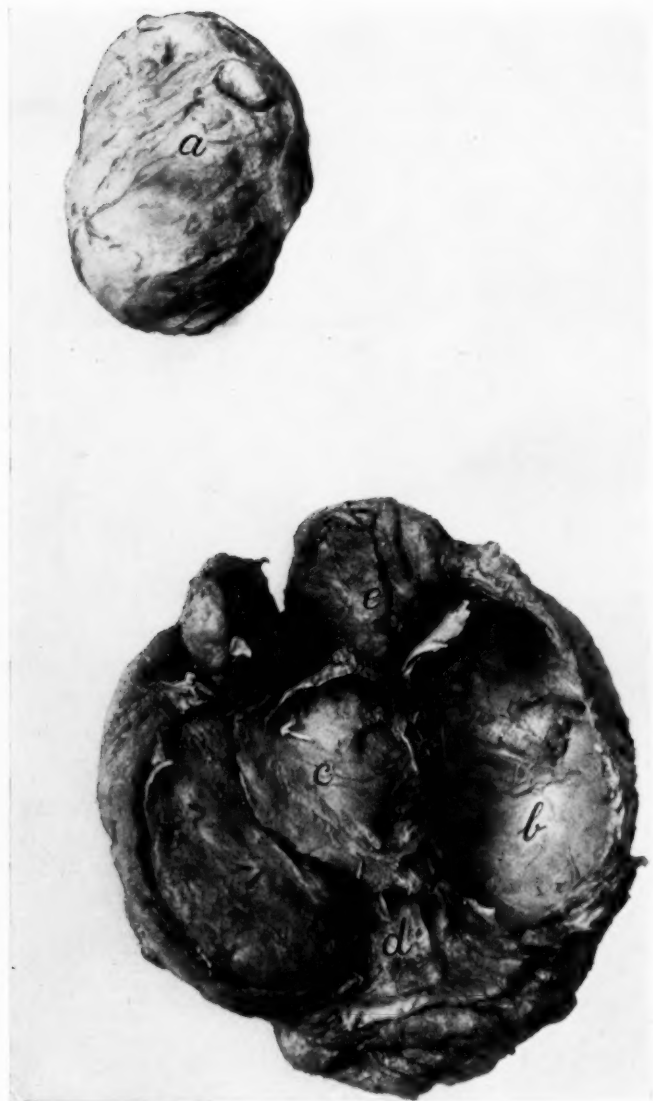


FIG. 4.—(a) Enucleated left lobe. (c) Roof of the chamber turned back in order to expose the interior of the chamber from which the lobe (a) has been removed. (b) Interior of chamber formerly occupied by left lobe. This has no communication with the chambers of other lobes. (Watson.)

directed to the question of the merits of certain special techniques. *Many of them are excellent, and yield results so little different in character in any respect, that no important advantage can be claimed for one to the exclusion of the others. The really essential point for those who are experts in this special province is to bring home the fact to the profession at large that the operative treatment of prostatic hypertrophy has been brought to a sufficient degree of perfection to make it evident that the patients should be given the benefit of it, and should not be submitted to the dangers of catheterism as they have been in the past, until it is hopeless to interfere surgically in many instances.*

Fig. 2 shows the finger beginning the enucleation of one of the lateral lobes as I am accustomed to begin it when doing the enucleation after the manner of Gouley. It will be noticed that the floor of the prostatic urethra is not injured, but lies behind and beneath the finger and the lowest point of the urethral part of the enucleation.

In Fig. 3 the finger has entered the space between the surface of the gland and the inner aspect of the urethral side of the outer sheath. The pulp of the finger-tip is held upward, and the pressure which is exercised by it in making the enucleation, and while separating the posterior surface of the gland from the outer sheath, will be directed always upward and outward; when the front and upper surfaces of the lobe are being detached, the pressure is made laterally; *at no time should it be directed downward towards the rectum*, for the latter is very liable to be injured if this precaution be neglected, particularly if the operator has failed to place the tips of one or two fingers of the other hand in the rectum while making the enucleation.

In Fig. 4 one lateral lobe of the gland has been enucleated by the finger. This has been done in this instance by entering the fibrous sheath through the upper part of the side of the urethra, and that side of the urethra together with the urethral aspect of the fibrous capsule is turned back across the floor of the prostatic urethra in order to expose to view the interior of the chamber within which the lobe was formerly enclosed. It

will be seen that the inner wall of this chamber is elsewhere intact except at the part at which the finger broke through. Next it will be noticed that the outer side of this chamber is much thicker than its inner or urethral aspect. Again, it is to be noticed that the chamber and fibrous capsule which constitute its walls are wholly separate from the corresponding chambers of the other lateral and the middle lobes. Finally, as far as the gross appearances permit us to determine, the intravesical aspects of the gland are in this particular case obviously covered by the fibrous capsule as well as by the mucous membrane of the bladder, and not by the latter alone, as has been asserted to be invariably the case. It is in the outer, lateral, and anterior parts of the fibrous capsule that the extensive venous plexus runs, which fact makes it important not to wound that part of the capsule when removing the gland.

Fig. 5 shows in some respects quite the contrary conditions to those seen in the preceding figures. In this case there is an entire absence of the space between the gland and its outer fibrous sheath that was shown in the last figures. The contrary condition exists of an intimate and inseparable connection between the two. It is difficult to see any line of distinction between the gland tissue and the outer capsule.

The prostate has been cut almost, but not quite through, transversely not far from its vesical end, and the anterior half of it has been turned down and hangs by a thin strip of tissue to the posterior half, which is not separated at all from its natural connections from the bladder.

The point that I wish to emphasize in connection with this specimen is that when such a condition as that which is seen here is met with, the operator should not persist in the attempt to enucleate, for enucleation is impossible to effect properly or safely in such a case, because of the wounding of the outer capsule, which is practically inevitable under the circumstances, and the hæmorrhage which will result. Removal will be best accomplished by morcellement, and it is wise not to try to effect a complete removal, but to leave a thin layer of



FIG. 5.—Specimen of the author's showing gland in which the attachments between the sheath and the surface of the gland are very intimate, and make the case one in which it is difficult or impossible to enucleate.



FIG. 6.—(a) Bit of the capsula vera turned back from the left lobe. (Watson.)



FIG. 7.—Two lateral lobes and prostatic urethra enucleated in 1897 in one mass by suprapubic prostatectomy. (Watson.)



FIG. 8.—(a) Two lateral lobes. (b) Median lobe removed by Gouley's perineal prostatectomy.
(Watson.)



FIG. 9.—(a) (b) and (c) Middle and two lateral lobes removed by Gouley's perineal prostatectomy. (Watson.)

the gland attached to the inner surface of the outer sheath instead.

Fig. 6. A small bit of the inner or true capsule has been turned back from the side of one of the lateral lobes in order to show how close the connection is between the gland and the capsula vera, and also how thin and delicate it is compared with the outer or fibrous sheath.

Owing to these two characteristics, enucleation cannot be properly carried out between the capsula vera and the gland surface; and if it is attempted, the operator will inevitably lose his way, and moreover will leave numerous bits of the gland attached to the inner surface of this thin capsule, and hence fail to make a complete enucleation.

Figs. 7, 8, and 9 show the gland after its enucleation in three different cases, in one, two, and three separate masses respectively. The first specimen represents a bilateral hypertrophy of the gland which I removed in one mass together with the prostatic urethra by the suprapubic route in 1897, or some three or four years before Mr. Freyer published what he has termed his "new operation," which is done in identically the same way as that which I pursued in the case from which this specimen was taken.

The fact that I removed the hypertrophied gland in one mass together with the prostatic urethra *did not strike me then, nor does it seem to me now, to constitute a "new" procedure* that could be considered as distinctive in any essential sense of the word from the original suprapubic prostatectomy of McGill. I refer to it here in order to recall the fact that the credit of suprapubic prostatectomy belongs to Belfield and McGill as certainly as it does not belong to Mr. Freyer, to whom we do owe, however, the fact that it has been revived in England, and shown to a greater advantage than has hitherto been done by any one, and where it remains the favorite and almost the exclusively practised method, the surgeons of that country never having given any serious attention to the perineal operation which is so widely but far from

exclusively practised here in America and, though more exclusively, also in France within the last few years.

The figures also show incidentally how cleanly the finger enucleation is often accomplished, the fact being evident from the smooth surfaces of the enucleated masses. The method employed was that of Gouley in the two perineal operations in which the lobes were removed each as a separate mass, and the method of McGill in the case of the single mass.

The specimen from which Fig. 10 was taken is that of a very extensive three-lobed hypertrophy in which the median lobe reaches high up into the bladder and constitutes a condition which, it must be said, is not a common one, in which the Bottini operation becomes so difficult to perform as to make it unwise to attempt it, or, as I personally believe, impossible to accomplish at all, and in which it is so obvious that the growth is within the sphere of a suprapubic prostatectomy that that operation is clearly the one that common sense dictates to be the best to apply in such a case. This I have shown in order once again to emphasize the desirability of not becoming so possessed by the partisan view in favor of one operative method alone as to lose the receptive and elastic qualities that are among the best that a surgeon can have. It is this view for which I contended at the outset many years ago, and have always held ever since, namely, that the choice of operative method was determined by the forms and size of the glandular enlargements, and by the direction which they took with reference to the interior of the bladder, which occasionally made the suprapubic operation that of choice.

Fig. 11 depicts a post-mortem specimen from a case in which the patient died on the fifth day after perineal prostatectomy done by the rapid perineal finger enucleation already described as that of Gouley. Death was due to uræmia in connection with a chronic interstitial nephritis. The specimen represents in its upper part the interior of that part of the bladder immediately surrounding the vesical orifice which lies in the figure above a horizontal line drawn between *a* and *a*. The rest of the specimen which lies below this line shows the

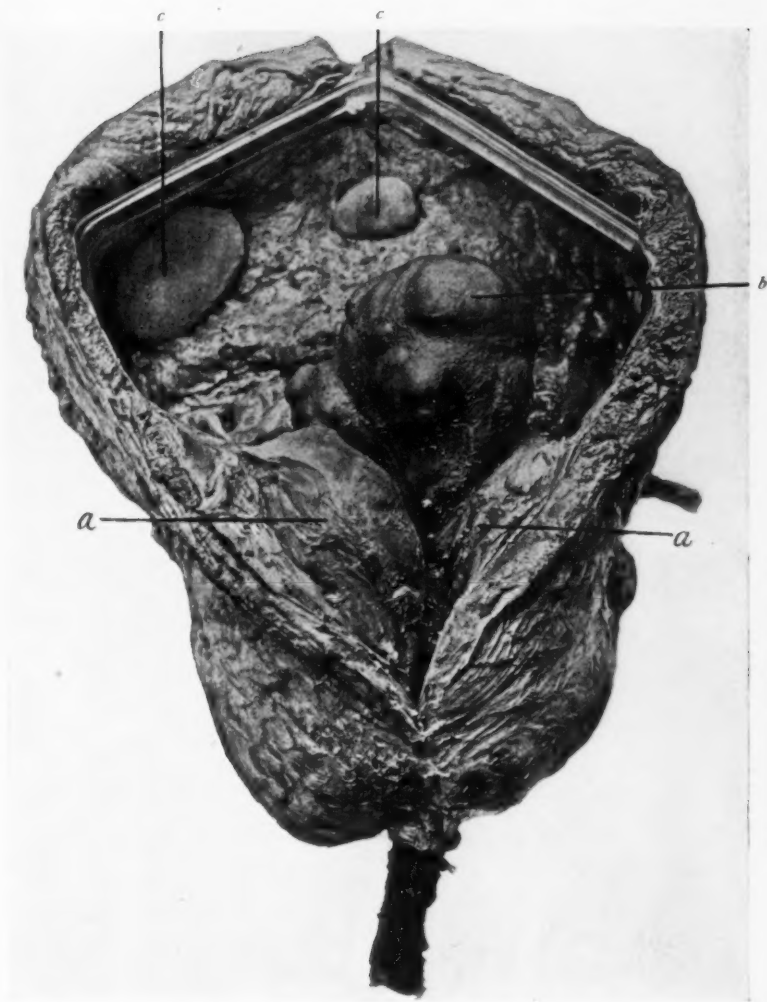


FIG. 10.—Bladder and part of prostatic urethra opened in front. (*a-a*) Extensive enlargement of the two lateral lobes. (*b*) Very large median hypertrophy. (*c-c*) Vesical calculi. (Watson.)



FIG. 11.—(a-a) Vesical orifice laid open by an incision through the middle line above. The space included in the limits designated by the letters a-b-b-b-a, is the inner surface of the bladder wall immediately surrounding the vesical outlet. The irregularly quadrilateral space included within the limits designated by the letters a-c-c-a, represents the inner surface of the fibrous sheath of the prostate and of the chambers formerly occupied by the lateral lobes. (d-d) The mouths of the ejaculatory ducts, a wire issuing from each. (e) Floor of prostatic urethra.

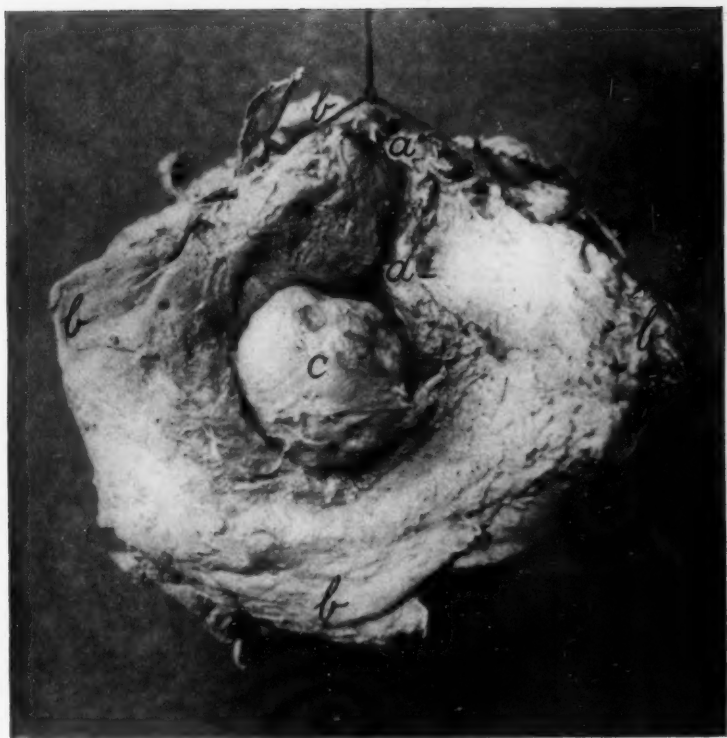


FIG. 12.—(a-a) Cut through vesical orifice closed again by suture. (b-b-b) Inner surface of bladder immediately surrounding the vesical outlet, the rest of the bladder having been cut away from it. (c) The middle lobe of the prostate projecting into the bladder from the prostatic urethra. (In this illustration the lateral lobes are concealed by the bladder wall, which intervenes to hide them from view.)

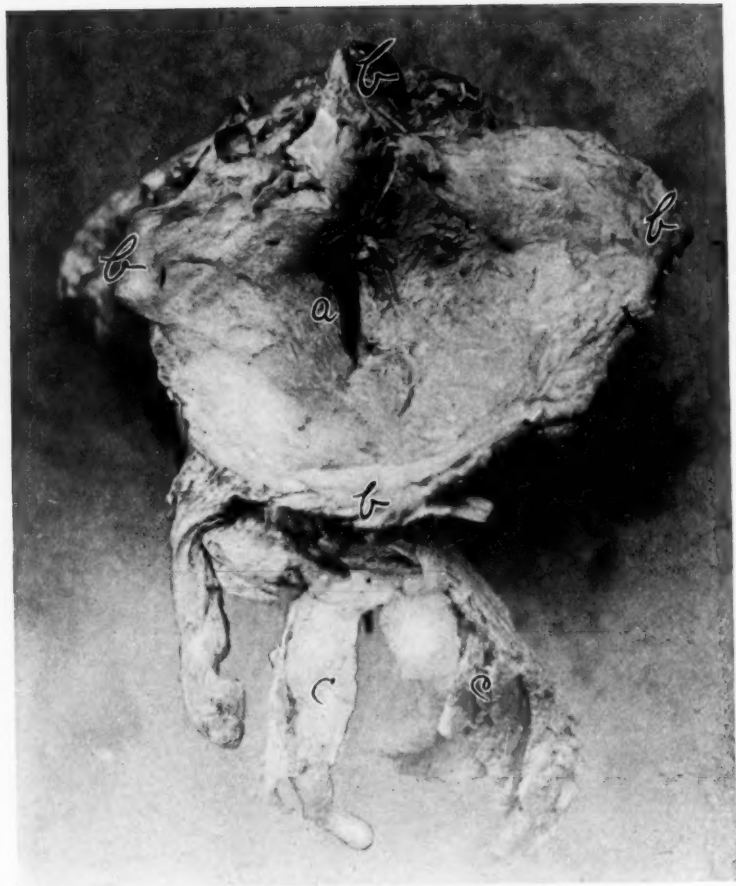


FIG. 13.—*a*, The vesical outlet after the removal of the prostate; *b, b, b, b*, inner surface of bladder wall surrounding it, which, it will be noted, is uninjured; *c, c*, seminal vesicles, vasa deferentia, etc.

space formerly occupied by the hypertrophied lateral lobes of the prostate, its presenting face being the inner aspect of the outer or fibrous sheath except along the middle line, about half-way upon which the two wires emerge which is the floor of the prostatic urethra. The vesical orifice and anterior surface of the outer sheath have been cut through longitudinally in the middle line, and the whole interior of the space formerly occupied by the gland and prostatic urethra have been exposed to view by drawing apart the edges of the divided tissues. In the middle of the specimen are seen two wires, one of which enters each of the ejaculatory ducts and traverses the whole of their lengths except a very small bit of them just behind and including their orifices, which were torn away in the course of the enucleation.

The particular feature which I wish to emphasize in connection with this specimen is that the ejaculatory ducts may be saved even when removing the gland by the finger enucleation carried out through the median perineal urethrotomy incision, and that, as I said in the earlier part of my remarks, the criticism directed against this operation because of the destruction of the ejaculatory ducts which it has been implied was necessarily involved in its performance is not sustained. I would add that there was no effort made especially to preserve the ducts when the operation was being done.

The other point to which I shall again refer is that the outer fibrous sheath and the bladder wall covering the intra-vesical parts of the enlarged gland are nowhere injured.

Figs. 12 and 13 present another view of the same specimen as the last one. The cut through the vesical orifice which was made in order to display the interior of the prostatic chamber in the last figure has been brought together again by suture, so that we are now looking directly down upon the inner surface of the part of the bladder which immediately surrounds the vesical outlet, the rest of the bladder having been cut away. In Fig. 12 the prostate has been replaced in its chamber, and the middle lobe is seen projecting from the vesical orifice

into the interior of the viscus in a manner similar to that which existed prior to operation.

Fig. 13 is the same, except for the fact that the gland has once more been withdrawn, and the condition presented is now that which actually existed after the operation. The only change or sign of disturbance of the natural structure of the bladder wall or outlet is that of a slight enlargement of the latter, which is little, if at all, greater than what is produced by the stretching of it due to the passage of the finger and the withdrawal of the middle lobe through it. (The masses which depend from the lower side of the specimen are the seminal vesicles and parts of the vasa deferentia. The bladder wall stands in front of and conceals from view the chamber from which the enlarged gland has been removed.) The point that is especially well shown in this figure is the absence of injury done by the operation to the bladder.

Figs. 14 and 15 present an unusual variety of a frequently seen condition of the bladder secondary to the enlargement of the gland, unusual in that instead of the trabeculation or single diverticula such as are commonly found, there is in this case a four-chambered diverticulum, the different compartments of which unite upon the inner surface of the bladder into one mouth, and they divide into four, one opening into each of the pouches. The individual spaces were completely shut off one from the other by well-marked septa which extended from the mucous membrane upon the surface to the further limit of the chambers. On the right upper side of the figure is the orifice of a single diverticulum which was also present, and was somewhat larger in its capacity than all four of the other chambers taken together.

Fig. 14 represents that part of the bladder which was cut away from the part immediately surrounding the vesical outlet shown in the two preceding figures; the front surface has been cut through longitudinally and we are looking into the interior of the organ. The diverticula in this case were at the summit of the organ.

Fig. 15 is the same specimen turned over so that its

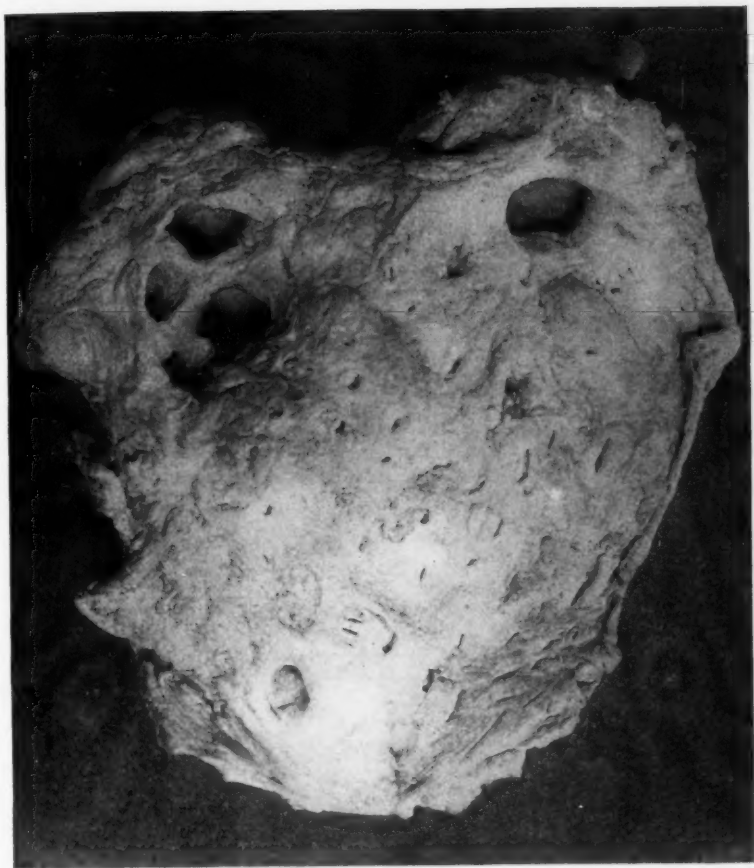


FIG. 14.—Inner surface of the bladder, showing the mouths of the diverticula opening into it.



FIG. 15.—Same specimen turned over to show the opposite side. The posterior aspect of the diverticula have been cut across in order to expose the interior of the chambers and to show the septa dividing those on the right

exterior or outer surface is shown. The chambers of the diverticula have been cut across in order to show their inner aspects and the septa which separate the individual cavities of the four compartments which are grouped together. None of the pouches contained calculi. The capacity of the pouches altogether, when they had lost the elasticity of the walls, and when they were not distended, was forty cubic centimetres. During life they would probably have contained not less than five ounces when distended.

My personal connection with this subject dates back seventeen years, at which time I published a monograph which embodied my beliefs with regard to the operative treatment of the hypertrophied prostate, from which publication I ask leave to quote a few of the more important conclusions, as follows:

1. *That the mortality attending the catheter treatment was even then greater, except in the class of people of the best social status, than that attending prostatectomy, and that the mortality of perineal prostatectomy, were it practised at a sufficiently early stage of the progress of the malady, would certainly prove to be far less than that associated with the catheter treatment, in all classes of persons.*

2. That in the large majority of cases the prostate was readily accessible and easily to be removed through the perineum.

3. That in a minority of cases it was not thus accessible, but was readily so through the suprapubic route.

4. That the mortality of the perineal prostatectomy was less than that of the suprapubic operation; that the former therefore became, in all cases in which it was applicable, the operation of choice, and that the best way to determine whether any individual case was or was not suitable for the perineal operation was to make a digital exploration of the actual conditions present through the posterior urethra by means of an ordinary external perineal urethrotomy incision, as the first step of the operation. That at least twice out of three times the gland would be found to be readily removable by the

perineal urethral incision, just mentioned, and that in the other third of the cases *the surgeon would proceed to go on to do a suprapubic operation at once*, the perineal urethrotomy exploratory incision not only not interfering with its performance, but, on the contrary, aiding in it, and also supplying additional drainage afterwards.

It will be seen therefore that my chief contribution to the subject of operative treatment was the demonstration of the fact that perineal prostatectomy through an ordinary external perineal urethrotomy incision was readily to be accomplished *in a large majority of cases, and that it was the operation of choice because of its lower mortality*, but not the exclusively to be adhered to operation, the suprapubic method having a very definite and distinctly advantageous place, which was, however, in a minority of the whole number. These opinions I have never seen reason to alter, and they are those which are to-day generally accepted.

I have been led to make this reference to my own share in the matter largely because of being the first advocate of perineal prostatectomy in the manner proposed by Gouley in this country.

These views were then, however, regarded as being so radical that they received little, if any, attention. It has taken a good many years for even the specialists to awake to their truth; but it is correspondingly satisfactory to have these statements that I have given above, and which were those which I urged seventeen years ago, finally receive such a wide endorsement as they have had in the course of the last three or four years, and especially to see perineal prostatectomy become so fully accepted as it has been in France and America, though under a multiplicity of what might almost in some instances be termed mannerisms rather than methods.

In conclusion, I would suggest that perhaps the most valuable contribution that could be made at the present time to the subject would be to have reported the cases treated by the catheter throughout, with special reference to the mortality and the time which elapsed between the beginning of

the catheter treatment and death in the cases in which death was obviously referable to the secondary results of prostatic hypertrophy, and the catheter treatment, or in which, at any rate, that treatment failed to avert the fatal termination, for in no other way, I think, will the conviction be so forcibly brought home to the profession at large of the dangers attending the catheter treatment or contrast them so strikingly with the benefits that the operative treatment is capable of offering, as might be done in this way, and the general practitioner be induced to transfer these cases at an early period of the malady to the surgeon for operation. What results may be looked for if this be done has been amply established by the brilliant series of operations reported by Goodfellow, Young, Albarran, and others.

THE QUESTION OF PRIORITY IN THE ADOPTION OF THE METHOD OF TOTAL ENUCLEATION, SUPRAPUBICALLY, OF THE HYPERTROPHIED PROSTATE.

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RECENTLY, while performing a suprapubic prostatectomy, a doctor in the audience remarked that I did the Freyer operation. I corrected him with the statement that I was performing the operation which I devised and first practised in 1894 and published in 1895, the same operation that Freyer first performed in 1900 after being acquainted with the details of my operation by a New York surgeon, a friend of mine, who had modified my procedure slightly, and that Freyer in 1901 had published the operation as his own without making any mention of me or of Dr. Ramon Guiteras, the New York surgeon alluded to.

A short time after the preceding occurrence, Dr. J. William White, of Philadelphia, sent me a reprint of his article which appeared in the December, 1904, number of the *ANNALS OF SURGERY*, entitled "The Present Position of the Surgery of the Hypertrophied Prostate." In this article I was struck by the following statement: "Largely through the work of one surgeon, Mr. P. J. Freyer, suprapubic enucleation of the entire gland has during the last decade become the operation of choice in the majority of cases." Dr. White made no mention of any prior work in this connection. I knew that Dr. White, at the time when I brought out my operation, was very much preoccupied with the idea that he had solved the troublesome problem of relieving urinary obstruction from prostatic hypertrophy through castration, and was apparently taking little interest in surgery directly connected with the gland itself. Consequently, I felt that there might be an

element of excuse in the omission, as Freyer published his article shortly after the profession at large had wholly abandoned the White procedure, and when its author's interest in prostatectomy was reviving. Other occurrences similar to these have made it evident to me that the profession as a whole is not familiar with the status of this question or with the controversy in the *British Medical Journal* which followed the publication of Freyer's article. It is on this account, and also at the solicitation of friends, that I have prepared this paper.

The original description of my operation was published in the *Journal of Cutaneous and Genito-Urinary Diseases*, New York, June, 1895, in an article entitled "Six Successful and Successive Cases of Prostatectomy."

The account of the operation is as follows:

"The patient is placed flat on his back, neither the Trendelenburg position nor the Petersen bag being commonly found necessary. The bladder is carefully washed out, and then left moderately distended to the extent of from eight to twelve ounces. The next step is to open the bladder suprapubically, the general directions which had been laid down by Keyes being followed. The forefinger of the left hand is then introduced into the bladder, the location and extent of the prostatic obstruction determined, and the vesical opening of the urethra located. In the right hand is grasped a pair of rough, serrated-edged scissors with a long handle. These scissors are slipped along the left forefinger to the urethral opening, and are made to cut through the bladder wall in that region. The cut extends from the lower margin of the internal vesical opening of the urethra backward for an inch to an inch and a half. The blades of the scissors, being rough and serrated, make an incision which bleeds but little. Then one of the forefingers, whichever the operator may find the more convenient, is slipped through the vesical hole made by the serrated scissors, while at the same time the fist of the other hand makes firm counterpressure against the perineum. By means of this counterpressure the prostatic growth is brought well into the reach of the forefinger of the other hand, which is employed all this time in enucleating the prostatic obstruction

en masse, or piece by piece, as the case may be. This enucleation can be easily and speedily accomplished in this manner, and should not be desisted in until all the lateral and median hypertrophies, as well as all hypertrophies along the line of the prostatic urethra, have been removed. The vesical walls at the base, as elsewhere, are very elastic and dilatable, so that it will be found that the little cut made through the bottom of the bladder will be large enough to admit of the passage through it of the enucleated prostate.

"Figs. 1 and 2 accompanying this article are natural-sized illustrations of prostatic hypertrophies which I have enucleated in the manner described. In Fig. 1 the whole hypertrophy was removed in one piece, while in Fig. 2 the obstruction came away in three pieces, representing two lateral and a median hypertrophy. . . . A perineal section is then made, and a large size (twenty-six American) soft rubber tube is passed through the perineal cut, and the cut through which the prostate was enucleated, into the bladder. After this, hot-water irrigation is employed for some minutes to wash out blood-clot and to stop oozing. Then the suprapubic wound is closed by a deep layer of catgut sutures which include the bladder wall, and by a more superficial layer of silkworm-gut (Florentine) sutures. About in the middle of the cut the catgut stitch is omitted and a deep Florentine gut suture is taken, which includes the vesical walls and the whole extent of the lateral abdominal walls. This suture, however, is not tied at the time of operation, thus allowing a rubber suprapubic drainage-tube to temporarily remain in position. At the end of four or five days, however, this suprapubic drain may in most instances be removed; then this last Florentine ligature can be tied, thus entirely closing the suprapubic cut. It is best not to remove these Florentine sutures till after the patient is up and about, as without their firm support there is oftentimes a tendency for the soft scar tissue of the wound to give, thus allowing a considerable spreading of the abdominal structure.

"My method of enucleating the prostate through a small hole made in the base of the bladder is accomplished by a technique almost the opposite of that advocated by Nicoll, of Glasgow, in the *Lancet*, April 14, 1894, and by Alexander, of New York, independently of Nicoll, at the May (1894) meeting of the American Genito-Urinary Association. These gentlemen enu-



FIG. 1.—Dr. Fuller's specimens of prostatic hypertrophy removed by enucleation (natural size). Showing the entire hypertrophy enucleated in one piece.

(A reproduction of the cuts which appeared in Dr. Fuller's original article in the *Journal of Cutaneous and Genito-Urinary Diseases*, June, 1895.)



FIG. 2.—Showing the hypertrophy enucleated in three pieces, two lateral and a median.

cleate the prostate through a spacious perineal wound, that gland being brought into the reach of the perineal finger by the pressure extended downward and forward by the finger or fingers of the other hand introduced into the bladder through a suprapubic incision. Then after such enucleation a dependent incision is made into the bladder and perineal drainage established. My first case of enucleation by my method was performed early in May, 1894, before I was aware of Nicoll's publication, and before Alexander had also reported that method. I can say of my method of enucleation that by it the prostatic hypertrophy can be easily and thoroughly removed without damage to the structures composing the vesical neck, and that hæmorrhage resulting from it has always been of little consequence. Owing to the slight amount of bleeding, I have always found it feasible to sew up as I have described the suprapubic cut, and have never experienced trouble from secondary hæmorrhage."

In speaking of results, I have this to say:

"In almost all cases also the use of the catheter can be entirely dispensed with after convalescence from the operation is wholly established, the apparently atonied bladder gradually regaining its muscular force until finally it throws off a full forcible stream. In many instances previous evidences of renal trouble, due to pyelitis caused by dilatation of ureters and pelves, gradually disappear as these muscular structures also in like manner as the bladder regain their tone. As a result of all these changes and regenerations, the patient at the end of six months or a year after the operation is apt to report hale and hearty, declaring that he feels ten years younger, and that his act of urination is all that he could desire. I am well aware that many surgeons will consider that the foregoing statement in favor of the radical removal of the obstruction is too rose-colored, and will point to the indifferent results obtained in many instances by earlier operators to sustain their opinions. I, however, hold that the argument against prostatectomy on the ground that the results to be expected from it are indefinite and unsatisfactory is a false one, and that it is based on cases where the removal of the hypertrophy at the time of the operation was incomplete. In many of the earlier unsatisfactory cases the object of the operator was

simply to chisel out, as it were, a canal through the obstruction at the vesical base connecting the post-prostatic vesical cul-de-sac with the membranous urethra, no attempt being made to remove lateral obstructions or the rigid hypertrophies surrounding the prostatic urethra. If, however, all the hypertrophies—median, lateral, and round about the prostatic urethra—are removed, as they should be, and as they can be by adopting the method I advocate, then I claim that the results, as far as the bladder is concerned, are, barring mortality, satisfactory.”

In the spring of 1900, my book, “Diseases of the Genito-Urinary System,” The Macmillan Company, New York, was published. In this book, which appeared before Freyer’s article on operative work, I incorporated my 1895 paper just quoted.

In August, 1900, Dr. Ramon Guiteras, of New York, read his paper, “The Present Status of the Treatment of Prostatic Hypertrophy in the United States,” before the Paris meeting of the International Medical Congress, in which he announced his modification of my suprapubic prostatectomy. In my operation, while one hand is engaged in enucleating the prostate, the fist of the other hand makes firm counterpressure against the perineum. In Guiteras’s modification, one or two fingers are introduced into the rectum to make upward counterpressure against the prostate itself while the suprapubic enucleation is being accomplished. Dr. Guiteras’s paper appeared in the *New York Medical Journal*, December 8, 1900. Dr. Guiteras, on his way to Paris to attend this meeting of the International Medical Congress, stopped in London, and while there called on Mr. P. J. Freyer at St. Peter’s Hospital, and fully instructed and acquainted him with my operation, as well as with his own modification. In substantiation of these statements, I submit this copy of a letter written me by Dr. Guiteras:

February 5, 1905.

EUGENE FULLER, M.D.,

Lexington Avenue and Thirty-fifth Street, City.

DEAR DOCTOR,—I read a paper entitled “The Present Status of the Treatment of Prostatic Hypertrophy in the United States” in the Section of Urinary Surgery of the International Medical Congress in Paris,

August 4, 1900. In this paper I explained the different methods that are employed in operating on the prostatic gland in this country. An abstract of this paper was published in the transactions, but the paper in full came out in the *New York Medical Journal*, December 8, 1900. I had the pleasure of meeting Dr. Freyer in London on my way to Paris, and explained to him your method of enucleating the prostate that you had been using for a number of years, and which I had been following, with the exception of introducing my fingers into the rectum for the counter-pressure instead of pressing upon the perineum. Dr. Freyer was very much pleased with the description of the operations, and said that he would try the method. Since then he has operated a number of times, but describes his operations as though he had originated the operation of suprapubic prostatectomy which had been performed for so many years previously by other operators. I am sending you the reprint of the Paris paper.

(Signed)

Yours sincerely,
RAMON GUITERAS.

Freyer's first case of suprapubic prostatectomy entered St. Peter's Hospital on November 21, 1900, shortly after Dr. Guiteras's instructive visit, and Freyer, showing himself an apt student, operated successfully, following the exact method taught him by the New York surgeon.

On June 26, 1901, Mr. P. J. Freyer delivered a clinical lecture on total extirpation of the prostate for radical cure of enlargement of that organ before The Medical Graduates' College, London. This lecture appeared in the *British Medical Journal* of July 20, 1901. After some opening remarks, he states: "I have in four cases undertaken a new and, at first sight, a very formidable operation for radical cure of the enlarged organ, namely, total extirpation of the prostate in one and all with entire success. These four operations have completely revolutionized my views with regard to the treatment of this painful and widespread malady, and I submit that the complete success with which they have been attended opens up a new and promising era in this field of surgery with far-reaching results." Then follows the surgical recital of the four cases, in all of which my method with Dr. Guiteras's modification was carefully followed. But nowhere was the operation described as other than new and original with the writer of the article.

Mr. Freyer's assumption of almost everything in sight in connection with prostatectomy was too much for English surgeons generally. Very many letters were promptly sent to the *British Medical Journal*, most of them in violent protest; and a prominent London surgeon, in a spirit friendly to me, quickly sent me a marked copy of the article, which enabled me also to embrace the opportunity, which would otherwise have been lost, to enter my protest with the rest. It is impossible here to detail all these letters, but any one interested can read them by examining the files of that journal. I will, however, quote from the letters bearing directly on the point at issue.

Mr. A. W. Mayo Robson, of Leeds, published his first letter in the *British Medical Journal* of July 27, 1901, protesting somewhat generally at Mr. Freyer's claims, and also because no mention had been made of his own extensive work. Mr. Freyer replied rather acrimoniously to Mr. Robson in the *British Medical Journal* of August 3, 1901, but admitted nothing.

Mr. Robson, in answer in the *British Medical Journal* of August 10, 1901, had this to say:

"Even if Mr. Freyer does not acknowledge that McGill enucleated the hypertrophied prostate, the operation said by Mr. Freyer to be original was described by Dr. Fuller in the *Journal of Cutaneous and Genito-Urinary Diseases*, Vol. viii, 1895, page 232, and on page 233 are shown drawings of prostates removed by enucleation which are very much like the drawings shown in Mr. Freyer's paper. A series of cases is also given at the end of the paper. This book can be seen in the library of the Royal Medical and Chirurgical Society. The operation is further described on page 415 of Dr. Eugene Fuller's work on "Diseases of the Genito-Urinary System," The Macmillan Company, of New York, 1900, where occurs the following passage."

Mr. Robson then quotes the steps in my operation, but, as these already occur earlier in this article, it is not necessary to reiterate them. Mr. Robson concludes his reference to me with the remark, "Moreover, Dr. Fuller's cases referred to above were completely cured."

Mr. Freyer, in answer to the preceding letter of Mr.

Robson, has this to say, regarding my work, in the *British Medical Journal* of August 17, 1901:

"The communication of Fuller referred to I regard as a valuable contribution to the surgery of the prostate. It exemplifies a higher step in the evolution of the operation of McGill and Belfield. But his operation is purely a partial prostatectomy, the obstructing nodules being removed from within the capsule sometimes by the finger, at others by cutting-forceps and scissors, of which a variety is figured. The prostatic urethra is cut into; a perineal section performed for drainage and counter-pressure made by hand on the perineum, whereas in my operation cutting-forceps and scissors are dispensed with, and by the finger-point alone, aided by a finger in the rectum for counterpressure, the whole prostate is enucleated in its capsule and stripped off the urethra, which is left untouched in the manner explained in my lecture, thus obviating severe bleeding and securing permanent immunity from recurrence of the disease. No perineal section is done in my operation."

This comment of Freyer on my work, the only one as far as I am aware that he ever made, is largely false or skillfully misleading. In the first place, as I remove the entire hypertrophy, and so distinctly state, Freyer draws a false conclusion in referring to my operation as a partial prostatectomy. It is also a false assumption on his part when he states that I only remove nodules within the capsule. I remove the same amount of capsule and the same amount of hypertrophy that he removes, as can be seen in the pictures in my article. I do not, however, assume in my article that the capsule I remove is the capsule proper of the prostate. I purposely left that question open as one for anatomists or histologists to decide. I have always been taught, when I remove a neoplasm, not to attempt to announce its exact nature at the time, but to turn it over to a pathologist for his opinion.

Freyer, however, in his characteristic manner, announces the fibrous structure covering the prostatic masses removed by enucleation to be the true fibrous sheath of the prostate, thereby getting himself into trouble with the anatomists and the histologists, and, because I did not make a like injudicious announcement, he tries to argue that my operation is partial. He also states that I accomplish removal "sometimes by the

finger, at others by cutting-forceps and scissors, of which a variety is figured." This is also another misleading statement. In my 1895 article, where I describe my operation, no instruments are figured. In my book on "Diseases of the Genito-Urinary System," where all operations on that part are described, there are, of course, cuts of various instruments. In my 1895 article, one only out of the six operations I had then performed was not amenable to my enucleation operation, and in that I had to use scissors and cutting-forceps. Freyer's attempt to argue from that fact that he did not wrongfully appropriate my operation as his own is hard to follow. All prostatic enlargements cannot be removed by enucleation, although the great majority can be. Any honest operator of experience will admit that. The only use I make of scissors in my enucleation operation is to cut through the base of the bladder exactly as Freyer, copying me, uses those instruments. All the rest of the operation of removal is accomplished by my finger-end alone, just as Freyer, copying me, uses his. In my operation, none of the urethra or bladder wall is removed, all being left just as in Freyer's imitation procedure. His statement, however, that he leaves the urethra untouched is so made as to allow the false inference that in my operation it is removed. My making a perineal puncture for drainage in the after-treatment is one special detail in which Freyer does not follow me, and that has nothing really to do with the operation, being merely a feature of the after-treatment. The other point that he emphasizes in which he differs from me is that I make counterpressure by a hand on the perineum, whereas he introduces a finger into the rectum for counterpressure. That is the feature wherein Dr. Guiteras's operation differs from mine, and, as Dr. Guiteras instructed Freyer in this particular, it is more natural that he should, in trying the operation, appropriate that gentleman's modification rather than my original procedure.

Mr. Robson, *British Medical Journal*, August 24, 1901, has this to say in answer to Mr. Freyer's previously quoted allusion to my work:

"Mr. Freyer, by raising side issues, attempts to divert attention from the chief points in the controversy. I hold that Mr. Freyer has not substantiated his claim to having performed an original operation, and that, had he been acquainted with the literature of the subject and with the work of others, he would never have made such a claim."

My own reply to Freyer's original article of July 20 appeared in the *British Medical Journal*, August 24, 1901. It was as follows:

"I was much interested in Mr. Freyer's article on total extirpation of the prostate which appeared in the *British Medical Journal* of July 20. On first glancing it over, I thought that Mr. Freyer was announcing himself as one of my disciples, so closely did he follow in my footsteps. But on closer reading I failed to find any acknowledgment of my tutelage." I then give the references to my work on the subject and close with the statement, "I think you will find in my method of prostatic enucleation practically everything to which Mr. Freyer now lays claim."

When I wrote this letter, I knew nothing of Dr. Guiteras's personal experience with Mr. Freyer. It was only recently, when I began to investigate the date of Guiteras's modification of my procedure in order to determine if it did not have precedence over Freyer's work, that Dr. Guiteras's connection in this matter came to my notice. Of course, if I had known then what I know now, my letter would have been framed very much more strongly than the one I wrote.

Mr. Freyer never took any notice of this letter of mine, but Mr. D. F. Keegan did, and in a way most gentlemanlike and just.

On the appearance of Mr. Freyer's first article, Mr. Keegan promptly wrote a congratulatory letter to the *British Medical Journal*, August 3, 1901, in which he states:

"The clinical lecture on total extirpation of the prostate for radical cure of enlargement of that organ, delivered by Mr. P. J. Freyer at the Medical Graduates' College, London, on June 26 and reported in the *British Medical Journal* of July 20, heralds a new and most promising epoch in operative surgery, and is in my opinion one of the most valuable and important clinical lectures published for many years. It will doubt-

less receive in the editorial columns of this journal the prominence it so richly merits; and I venture to state that I voice the opinion of the Indian Medical Service when I say that we, one and all, feel proud that it should have fallen to the lot of a member of our service to have made this great and important advance in the surgical treatment of enlargement of the prostate."

This certainly was a very handsome compliment. Every one knows Mr. Keegan's work on litholapaxy, and especially his discovery of the fact that litholapaxy in connection with boys, and even with very young male children, is not only possible, but a very safe operation in skilled hands.

His brilliant accomplishments, however, have been performed in India, where prostatic hypertrophy is seen very rarely, and then not in connection apparently with the native population. Accordingly, it is natural that he should not have been in close touch with the literature of the prostate when he wrote this congratulatory letter.

When my letter appeared, however, in the *Journal* in reply to Mr. Freyer, Mr. Keegan got my work, and, after reading it, wrote the following to the *British Medical Journal*, October 26, 1901.

"In modification of the letter which appeared above my name in the *British Medical Journal* of August 3, I would like to say that, having now read Dr. Eugene Fuller's work, 'Diseases of the Genito-Urinary System' (New York, 1900), I am of the opinion that in his operation designated the 'direct surgical removal of prostatic obstruction,' Dr. Fuller had in principle anticipated by some years Mr. P. J. Freyer."

Besides this letter to the *British Medical Journal*, Mr. Keegan was so polite as to write me a personal letter under the date of October 28, 1901, in which he states: "Having had the advantage of reading your work on 'Diseases of the Genito-Urinary System,' I wrote a short letter to the *British Medical Journal* which appears in this week's issue, and I trust you will consider that, though somewhat late in the day, I have accorded you your just due for being the first to deal in a rational and scientific manner with enlargement of the prostate."

Mr. Keegan's withdrawal of his credit for the operation under discussion from Mr. Freyer and his transfer of it to me would not have been done, I think all will acknowledge, had not my work, in his opinion, warranted it beyond all question. From his long association with Mr. Freyer, and from the tone of his congratulatory letter, it is fair to suppose that he would have had primarily a special disposition to favor the claim of his former associate in the Indian service.

Dr. White, in his article previously referred to in describing Mr. Freyer's present operative technique, speaks of his scratching through the vesical structure covering the prostatic hypertrophy. Mr. Freyer's former procedure, and the one I employ, is to cut through with scissors. I am prejudiced against scratching. As a boy, I was taught to strike out from the shoulder, and that scratching was a feminine method of fighting. In surgery, a scratch makes a nasty wound in comparison with a cut. I think Mr. Freyer would do better, should he continue, to cut through rather than to scratch through the vesical wall covering the prostate. But if he wishes to claim to be the original scratcher in connection with suprapubic prostatectomy, I certainly will not protest against that his only valid claim.

As I have been performing prostatectomy steadily and continuously for the past eleven years, my personal experience is now large. When I prepared the paper I read at the last June meeting of the American Medical Association, I found, on looking over my records, that my operative cases in all were slightly in excess of 300. Since that time I have operated on seventeen more cases without a death. I think I am safe in stating that I have performed prostatectomy more times than any other operator. Largely, I suppose, because I found my suprapubic operation most satisfactory, and consequently never lost time digressing from it to try castration, the Bottini operation, or any other of the various surgical makeshifts which have come and gone during the years I have been operating. I do not wish, however, to be considered as classing perineal prostatectomy among the surgical makeshifts. I em-

ploy that operation now in perhaps one-third of my cases, my technique being very similar to that observed by Goodfellow. The question of choice in a given case between suprapubic and perineal prostatectomy I consider an important one; but I will not touch upon it in this connection, as I have very recently discussed that topic in my paper entitled, "Prostatectomy: Is it Wise to try to make any One Operative Method apply to All Cases?" (*Journal of the American Medical Association*, November 12, 1904.)

I find that many of the recent articles on prostatectomy deal more with the question of mortality than with that of results. Both are of course equally important. As far as the mortality is concerned, it is surprisingly small at the hands of a skilled operator, considering the age of the patients and the seriousness of the disease. For the last two years I have been operating with a mortality under 4 per cent. in connection with patients of the better class, who have been able to provide themselves with the luxuries of special nursing and extras in the way of diet. Among charity cases, many of them destitute, my mortality is about $1\frac{1}{2}$ to $2\frac{1}{2}$ per cent. higher. Such individuals are apt to be suffering from malnutrition and the effects of exposure and neglect when operated upon, and consequently average worse risks. Special nurses and attentions also count much with aged individuals, as with children, and when such luxuries cannot be had, it is natural that the percentage of recoveries is somewhat lowered. I do not think it right for an operator in this branch of surgery to try to keep his percentage of mortality small by rejecting what seem to be the bad risks, or, in other words, to leave the bad risks to die in agony where, were it not for the fear of injuring his mortality statistics, he would have operated, thus ridding a patient of his suffering through the removal of the obstruction to urine drainage; the result being, even though death did finally ensue, a peaceful and placid ending.

My results are so nearly uniformly satisfactory and perfect, that it is my custom to assure a patient that after recovering from the operation he will be able to urinate naturally,

and at normal intervals will be able to empty his bladder completely, and that his urine will become free from pus and bacteria. As for a patient's sexual status after the operation, I do not consider it safe to be so positive, for a fair percentage of these elderly individuals have already lost that function through senility or through old inflammatory lesions in connection with the seminal vesicles. Prostatectomy will not restore potency in such cases. In a considerable number of those individuals who have lost their sexual force, the cause lies in the fact that the prostatic hypertrophy by its direct pressure on the seminal vesicles has caused atonic distention of those organs, the result being impotency. In such instances the removal of the hypertrophy will restore the sexual function. In a number of my operative cases representative of such a condition, satisfactory marriages have resulted the year after operation. If a patient still has sexual force before operation, in my experience prostatectomy ought not to injure the function, while in many instances it ought to improve it. I have never as yet been so unfortunate as to tear through the rectal wall in the performance of prostatectomy. I fear, however, that such an accident is not unusual. A layman a short time ago informed me that a friend of his who had had his prostate removed suffered considerably from the fact that much of his urine came away through the rectum, a common result of the operation, so he had been told. In a small percentage of cases, phosphatic stone may form in the granular area, from which the prostate was removed, and in a few instances in the convalescent period after prostatectomy I have had to perform litholapaxy. I have had but two cases which could not urinate satisfactorily after the convalescent period. In one of these tubercular pericystitis existed as a complication accounting for the failure of the bladder to regain its function. In the second case, owing to a ventral hernia left by a preceding operator who had opened the bladder suprapubically for stone, I was forced from doing a suprapubic prostatectomy, and had to perform the perineal operation, though I considered that operation contraindicated. In this case, however, the

patient largely recovered his vesical function. Although dribbling of urine and perhaps inability to voluntarily hold the vesical contents are not unusual for a few months after the operation, I have but one case where that condition has persisted. In that individual, a man of seventy-five years, from whom I removed a prostate, the central portions of which had liquified in areas through fatty degeneration, the power to hold his urine on exertion has never returned. While in bed he can, however, control himself. On a very few occasions I have had some trouble in closing suprapubic fistulæ, but have always succeeded in rebellious cases by resort to a slight plastic operation. I have no record of an instance wherein one of my cases has been left with a perineal fistula or with a rectovesical fistula.

THE TREATMENT OF PROSTATIC HYPERTROPHY BY ENUCLEATION THROUGH A SUPRA- PUBIC INCISION.¹

BY HOWARD LILIENTHAL, M.D.,

OF NEW YORK,

Attending Surgeon to Mt. Sinai Hospital.

FROM experience in thirty-one cases in my service at Mt. Sinai Hospital, I believe that the suprapubic is the safest and most thorough of all the operations for the relief of prostatic obstruction. Twenty of these cases are my own and eleven were operated upon by my adjunct, Dr. Joseph Wiener. Another case seen some years ago, and the only one not operated upon in the hospital, resulted fatally. The patient was uræmic and aphasic before the operation, and died of uræmia three days afterwards. Perhaps a cystotomy with secondary prostatectomy might have saved him. I have since employed this two-stage method to my great satisfaction, and I believe it to be one of the important advantages of the suprapubic operation. Operative recovery has occurred in every case of the thirty-one treated in the hospital, and perfect functional recovery in all except two, and even these two patients urinate without the use of the catheter. In one there is weakness of the sphincter, so that the man can hold only about three ounces of urine at a time. The other patient has a residual of from ten to 100 cubic centimetres, which I hope will disappear, especially as the suprapubic wound has been closed only about three months. He does not use the catheter and is apparently a well man. One old man operated upon at the age of eighty died some months later of an intercurrent disease. All the other patients, of ages varying between fifty and eighty-five at the time of operation, were functionally cured. My first patient

¹ Read at the meeting of the New York State Medical Society held in Albany, February 1, 1905.

died a few days ago of cardiac disease after nearly five years of perfect relief from prostatism.

Sexual power was increased after the operation in a number of instances; it was lost in none who were potent before. Great impairment occurred in one of my more recent cases. The patient, however, is a neurasthenic individual, and, judging by his symptoms, I am convinced that his impotency is of a functional nature, and I hope that the power will be restored. He is fifty years of age.

Most of the patients were feeble and many had renal disease and cardiac weakness; several had vesical calculi; two were diabetic; one was a sufferer from tabes, and after the failure of a Bottini's operation it was thought that the vesical disorder might be of nervous origin. He was promptly cured by suprapubic prostatectomy.

In view of such a record, it is but natural that I should prefer the operation which has made it possible.

I will briefly give the steps of the procedure, believing that, if carefully followed, success will be as certain in the hands of others as in my own.

There should be about two days of preparation. If there is cystitis, the bladder should be emptied by catheter every three hours day and night. Irrigation, unless there is a large amount of mucus, is not necessary. As an internal urinary antiseptic, I prefer salol in five-grain doses taken three times a day. Urotropin may be given when the wound is healed or well advanced in granulation. A little cardiac stimulation is usually wise, and the kidneys should be well flushed by copious draughts of water.

The patient being on the table, a catheter is passed into the bladder, and when the viscus is empty, a rubber atomizer bulb is attached to the catheter. The anæsthetic is then administered. In most cases nitrous oxide may be used in the beginning, and will frequently carry the patient safely through the operation. If unexpected difficulties arise, it may be followed by ether. A sagittal incision two or two and one-half inches long is made in or near the median line and the recti

retracted. The ungloved finger of the operator is inserted between the muscles, and the bladder inflated by the rubber bulb in the hands of an assistant until the viscus feels tense on digital palpation. The peritoneal reflection is now pushed up out of the way with the handle of the scalpel and held there with a blunt retractor. Two silk traction sutures are deeply placed in the vesical wall. Between these sutures the bladder is punctured with a narrow-bladed knife, and the opening thus made enlarged by stretching with dressing-forceps. Thus far from one to two minutes have probably been consumed without hurry and with no appearance of haste. The bladder is now explored by the finger; stones, if present, are removed, and the prostate is carefully palpated. An assistant inserts his finger into the rectum, pushing up the prostate so that it may be caught firmly with volsella. An incision is then made with scissors into the substance of the prostate through its capsule and enucleation performed with the aid of two fingers. This should be done deliberately, freeing first the posterior part of the organ and being guided by the assistant's finger in the rectum. If it is desired to examine the work by the eye the patient may be placed in Trendelenburg's position, when blunt retractors or a bivalve speculum will expose the field.

It is neither necessary nor wise to work so roughly as to avulse the prostatic urethra, which has been done purposely by some operators. For the last two years I have had each specimen examined by the pathologist for urethral mucous membrane, but none has ever been found.

Thorough flushing of the bladder with hot saline solution is followed by the packing of the prostatic portion of the wound with gauze. This may be done with the finger or through a large endoscope or proctoscope inserted into the wound. If hæmorrhage has been unexpectedly free, a few strips of gauze may be placed in the bladder to encourage coagulation. Perineal drainage is unnecessary. The patient, who has probably lost very little blood during the ten or twenty minutes of the operation, is put to bed with a sand-bag over the pubes. In forty-eight hours the gauze may be removed,

a tube inserted and permanent siphonage instituted, the long arm of the siphon being kept full by a slow stream from a large irrigating bottle. The patient is thus kept dry and quite comfortable. If he is very feeble, so that there is danger of pulmonary hypostasis, it is best to get him out of bed as early as the second or third day.

It is rarely necessary to pass the catheter during the convalescence, but the bladder should be frequently flushed out through the siphon-tube. I usually remove this tube before two weeks have elapsed, and the patient soon begins to urinate through the natural channel. The shortest stay of any patient in the hospital was two weeks and the average about four and one-half weeks.

An enumeration of some of the advantages of this operation follows:

It is radical; no important vessels or nerves are cut; the urethra is not injured. Wounding of the rectum must be extremely rare. I have never seen the accident, although wounding of the rectum in the perineal operation must be a not infrequent complication if one may judge by the number of published reports of this deplorable accident. Palpation and inspection of all parts of the interior of the bladder are easy and accurate, and one may thus gain, as in no other way, a perfect understanding of the mechanical conditions which cause the obstruction. Having decided upon suprapubic section, there is no need for pre-operative cystoscopy; in other operations upon the prostate cystoscopy is practically a necessity. There is an almost total absence of shock, and the patient may be out of bed in forty-eight hours. No part of the urethra having been removed, treatment by the passing of sounds is avoided. Drainage is procured by siphonage and without perineal counteropening. The operation may be easily performed under nitrous oxide anæsthesia. The operation may be performed in two stages, which may be of enormous value in hæmorrhage, in uræmia, or in grave sepsis of the bladder when catheterization is difficult or painful or dangerous. Speed is a most important element in the surgery of the aged, and

the method here described is by far the quickest of those recommended for the relief of prostatism. Lastly, but far from least, impotency rarely supervenes.

Great care and watchfulness are necessary during the course of the after-treatment if the case is to run smoothly.

The operation itself is so simple that any surgeon who masters the details as here described can hardly fail of success.

SUPRAPUBIC PROSTATECTOMY WITHOUT ETHER OR CHLOROFORM.¹

BY USE OF NITROUS OXIDE GAS ANÆSTHESIA.

BY JOSEPH WIENER, JR., M.D.,

OF NEW YORK,

Adjunct Attending Surgeon to Mount Sinai Hospital.

By removing the prostate gland through a suprapubic incision under nitrous oxide gas in a few minutes, we are enabled to-day to cure many patients who only a few years ago would have been looked upon as incurable. Suprapubic prostatectomy under nitrous oxide gas can be safely undertaken in the most desperate cases. Neither nephritis, nor cystitis, nor diabetes, nor advanced old age, are contraindications. Any man who is able to take nitrous oxide gas for ten minutes can safely have the operation performed.

We do not say that the suprapubic operation is the most desirable one in every case. But we do say, and say most emphatically, that the suprapubic operation is a safe, an easy, and a most satisfactory operation in any and every case of prostatic hypertrophy. I was told last winter that it was impossible to remove, by this method, a small, hard prostate under nitrous oxide gas in a few minutes. In Case VIII of this series, I removed a very small, hard, firmly adherent prostate in nine minutes. There is not the slightest doubt in my mind that any prostate, large or small, soft or hard, adherent or non-adherent, can be readily removed in a few minutes by the suprapubic operation. I grant that a good deal of physical strength and some experience are requisite. But, surely, neither physical strength nor experience are contraindications to the performance of any operation. In a former paper I stated that I did not know of any contraindications to the

¹ Read by invitation before the Eastern Medical Society.

operation, if it were performed under nitrous oxide. Increased experience but serves to substantiate the correctness of that claim. Not only have I been fortunate enough to have lost no case, but I can truthfully say that I have never seen a severe hæmorrhage, or a bad infection, or any shock, follow the operation. Of all the numerous objections made to the operation, by those who do not perform it, there is only one worthy of consideration. The former dangers of the operation due to the anæsthetic, to hæmorrhage, to shock, to sepsis, are not worth discussing to-day, because they no longer exist. There is no severe hæmorrhage, there is no sepsis, and there is absolutely no shock following the operation under laughing gas.

It is not true that more of our cases are impotent than after the perineal operation. Most of the cases that were potent before the operation remain so after the operation. One of my patients had sexual intercourse eight weeks after his prostate had been removed. Can we ask for a more rapid return of sexual power?

The one and only objection that I have had to the operation was the length of time the wound took to heal. True it is that the perineal wound takes just as long, but two wrongs do not make a right. We have been devoting much thought to the subject of shortening the time of after-treatment. While it is too early to speak definitely, I think I can say with some assurance that in future the suprapubic wound will be made to heal in a shorter time than in the past. By a novel method which I have under trial, I was enabled to have the bladder wound heal in nineteen days. Moynihan, of Leeds, has recently stated that the average length of time in his cases had been twenty-seven days. Do the sinuses heal more rapidly after the perineal operation?

Some surgeons have declared that we ought to use the cystoscope before operation, and by the cystoscopic picture decide whether a suprapubic or a perineal operation should be undertaken. If we find a large middle lobe projecting into the bladder, we are told the suprapubic operation is indicated.

If the lateral lobes are enlarged downward towards the perineum, then the perineal operation, we are told, is the operation of choice. Personally, I have never made a cystoscopic examination in the presence of marked prostatic hypertrophy, and I hope I never will. The cystoscope is not only an unnecessary, but often a dangerous instrument in cases of marked hypertrophy of the prostate. We can always make the diagnosis without it; the information it gives us is often incomplete and misleading, and its introduction is not rarely followed by an acute cystitis, the very complication we do not want at the time of operation. The less traumatism to the urethra and bladder before the operation, the shorter the after-treatment, and the more satisfactory the result. If possible, I avoid even passing a catheter before operation. The bladder and urethra in these cases resent all manipulation, and, until we are ready to open the bladder and drain it, our guiding principle should, we take it, be masterful inactivity.

Regarding the dangers of removing some of the prostatic urethra in doing the suprapubic operation, they are entirely theoretical. No bad results whatever have been observed. Moynihan claims that he gets better results when he removes some of the urethra with the prostate. I have done this in several cases, and have had complete cures result.

The cases I have to report are unselected consecutive cases. The youngest of the patients was fifty-four years old and the oldest eighty-two years. The average age was sixty-eight years. Most of the patients were in poor condition at the time of operation. Moreover, two of them were old diabetics, and another of them was having daily chills due to his infected bladder. Nitrous oxide gas was used exclusively in all cases. Several of the patients would probably not have made good recoveries had ether or chloroform been employed. The technique of the operation I have described in a former paper. The time of operation has varied from nineteen minutes, in one of the earlier cases, to five minutes in one of the later cases. The average length of time for the operation has been

ten minutes. Most of the patients have required gas only during part of the operation.

In two of the cases, V and VII, a preliminary suprapubic cystostomy was performed, and the bladder drained for some time before the prostate was removed. And that is just one of the great advantages of the operation,—that we can, in badly infected cases, or where an active hæmorrhage is going on into the bladder, first drain the bladder by a suprapubic incision, and then through the same incision remove the prostate in a few minutes. In this way even the most desperate cases can be completely cured.

Case V, an old gentleman of seventy-five years, had been catheterizing himself day and night for five years, and had had repeated attacks of orchitis and cystitis. When I saw him with Dr. H. S. Stark he was having a daily chill, accompanied by fever, anorexia, irregular pulse, and marked general depression. The urine withdrawn by catheter was 50 per cent. pus, and the catheter had to be passed every two hours. The man was thought to be dying, and I was asked to see him, not with the idea of operating on him, but simply to satisfy the relatives. Through a suprapubic incision the bladder was opened and drained for eleven days. Then, through the same incision, under nitrous oxide gas, the entire prostate was removed in eight minutes, and the man made a splendid recovery.

The other case in which I did a preliminary cystostomy was in Case VII. The patient was also seventy-five years old. When I saw him with Dr. Dinkelspiel, his bladder was enormously distended with urine and blood-clots, and it could not be thoroughly emptied. The general condition was none too good; accordingly I performed suprapubic cystostomy, and removed a handful of clots. Eight days later, through the same incision, I removed the entire prostate in just two minutes. This man also made a good recovery. It is, we believe, beyond cavil that both of these patients would probably have died had a perineal operation been done under ether or chloroform. And it is in just such cases as these, where we operate in two stages, that we achieve the most brilliant results. And

it is just for the desperate cases, in which only a few years ago no operation would have been undertaken, that I would most strongly recommend the suprapubic operation. If a man is not much over sixty, and is in good general condition, a perineal operation under ether or chloroform may safely be undertaken. But if a man is over seventy and in poor condition, especially if he have nephritis or diabetes, then the suprapubic operation under gas is ideal.

Mortality.—In experienced hands suprapubic prostatectomy, especially if done under gas, must give a very small mortality. I have been fortunate, in spite of the desperate condition of some of my cases, in saving them all. Increasing experience has taught us valuable lessons both in regard to the technique of the operation and in regard to the after-treatment.

SYNOPSIS OF CASES.*

CASE I.—W. N., eighty-two years old, referred by Dr. Max Rosenthal. Three weeks before I saw him for the first time, he had been suddenly seized with retention of urine. Following this attack there had been complete retention until the time of operation. High up in the rectum a large prostate could be felt.

Operation.—January 28, 1903, under gas, the entire prostate was removed through a suprapubic incision. A strip of gauze and a drainage-tube were inserted into the bladder. The time of operation was fourteen minutes. The prostate was two and a half inches in diameter, and it was traversed by the prostatic urethra. Recovery was uneventful.

CASE II.—S. S., sixty-five years old, referred by Dr. R. G. Wiener. In July, 1902, the man was seized with severe pain in the region of the bladder, together with very frequent urination, accompanied by straining. The prostate was moderately enlarged and tender. Attempts at catheterization were unsuccessful, and were followed by bleeding. Following this attack there were repeated attacks of a similar nature, gradually increasing in frequency. Nocturnal dribbling of urine set in, and became a distressing symptom. In May, 1903, the prostatic enlargement had become more marked, and there were twenty-two ounces of residual urine.

* For detailed account of cases, see author's former paper, *Journal of American Medical Association*, May 14, 1904.

Operation.—May 6, 1903, under gas anæsthesia, a suprapubic prostatectomy was performed in seventeen minutes. The prostate was as large as a lemon, and was traversed by the prostatic urethra. With the exception of a slight infection around the right spermatic cord, recovery was complete and uneventful.

CASE III.—W. C., fifty-seven years old, was referred to me by Dr. J. D. Khodoff. The doctor had on numerous occasions found glucose in the urine. During his stay at the hospital no glucose was found. The man complained of gradually increasing pain and frequency of urination, until he had to urinate every ten or fifteen minutes during the day and four or five times at night. Rectal examination revealed a moderately large prostate.

Operation.—July 6, 1903, under gas, a firmly adherent prostate was removed in nineteen minutes with great difficulty. Owing to the fact that we did not pass sounds, a stricture of the prostatic urethra resulted, and a perineal section had to be done. This was followed by some incontinence of urine, but the man finally made a good recovery.

CASE IV.—S. S., sixty-three years old, was referred to me by Dr. S. Breitenfeld. The man had had diabetes for several years, at times as much as 1.5 per cent. of glucose was present.

Five days before the operation, on rising in the morning, the man was surprised to find that he was unable to urinate. Thereafter he had to be catheterized regularly. By rectum a very large, tender prostate could be felt. The urine contained a trace of albumen, 1 per cent. glucose, and many red blood-cells.

Operation.—On September 4, 1903, under gas, the entire prostate was removed in eight minutes. The gland was as large as an orange, soft in consistency, and the urethra ran through it near its anterior surface. Owing to the fact that the man had diabetes, the wound healed slowly. However, the man made a perfect recovery; and, although he is still suffering from diabetes, he has had no symptoms referable to the bladder.

CASE V.—M. L. M., seventy-five years old, referred by Dr. Henry S. Stark. In 1898 he suffered for two months from frequent and painful urination. Following this attack the patient had been catheterizing himself day and night for five years. During this time he had had frequent attacks of cystitis and orchitis. At the time I saw him his condition was desperate. He was having daily chills, his pulse was poor, and the general

condition wretched. The urine was loaded with pus, and the catheter had to be passed every two hours. In view of the man's desperate condition, a radical operation was out of the question. As a palliative procedure, suprapubic cystostomy was determined upon.

Operation.—September 15, 1903, this operation was carried out. The temperature gradually became normal, and the pus disappeared from the urine. Eleven days after the preliminary operation, the large firmly adherent prostate was removed in eight minutes. The tumor consisted of two lateral lobes, each the size of a small plum, and about an inch of the urethra ran through the gland. The man made a perfect recovery. He gained thirty-five pounds in weight; he was able to hold his water four hours during the day and six hours at night, and there is no residual urine. This is the most striking case of the series. No one, we believe, will deny that a perineal operation under ether or chloroform would have promptly brought about the death of the patient.

CASE VI.—A. M. R., seventy-two years old, was referred to me by Dr. Joseph Anderson. There had been gradually increasing frequency of urination until a week before operation. Thereafter there had been complete retention. Catheterization was followed by bleeding.

Operation.—On January 22, 1904, under gas, the large prostate together with eight small calculi were removed. The entire operation, from the time that the knife was taken in hand until the packing was introduced into the bladder, took exactly six minutes. Recovery was complete and uneventful.

CASE VII.—S. M., seventy-five years old, was suddenly unable to pass any urine on April 4, 1904. Attempts at catheterization were followed by considerable bleeding. On April 7, 1904, when I saw the man with Dr. Dinkelspiel, the bladder was distended with urine and blood-clots, and it was not possible to empty it completely. Accordingly I performed suprapubic cystostomy under gas, and removed a large number of clots. The bladder was drained for ten days. I then removed the entire prostate through the same incision in less than two minutes. The prostate was as large as a lemon and the urethra ran through its centre. The wound healed completely and remained healed for some time. Recently, probably in consequence of a very pendulous abdomen, the lower angle of the wound reopened, and

there was some leakage of urine. The wound is again healed, and I have advised the use of an abdominal supporter.

CASE VIII.—A. N., fifty-four years old, referred by Dr. C. Theobald. There was a history of gradually increasing frequency of urination, associated with considerable pain. Prostate only slightly enlarged; no cystitis. Prolonged medical treatment had been of no avail.

Operation.—On June 30, 1904, under gas, a small, hard adherent prostate was removed with some difficulty in nine minutes. A small portion of the urethra which ran through the tumor was also removed. The bladder wound was closed by secondary sutures according to a method which will be described at a later day. Nineteen days after operation no more urine came through the suprapubic wound. Complete recovery was uneventful. Eight weeks after the operation the man had sexual intercourse.

CASE IX.—M. R., sixty-seven years old, referred by Dr. Breitenfeld. During six years prior to operation there had been increasing frequency of urination. During the past year urination had become more and more painful. The man had to urinate every half-hour during the day and frequently at night. The size and force of the stream had steadily diminished. By rectum a soft, uniformly enlarged prostate was felt.

Operation.—On September 2, 1904, a prostate as large as a lemon, together with some of the prostatic urethra, were removed under gas in five minutes. Secondary suture of the bladder was done. Recovery, which was delayed by an exudate in the pre-vesical space, was otherwise complete and uneventful.

CASE X.—E. S., sixty-five years old, was referred to me by Dr. S. Kohn. During the two years prior to the time he came under observation, the man had noticed that his stream of urine was becoming smaller. There had been gradually increasing frequency of urination. Urination had become so painful that the man was incapacitated for work. The prostate was found very much enlarged, and the bladder extended two inches above the symphysis.

Operation.—On October 6, 1904, under gas, a prostate the size of a small lemon was readily removed in seven minutes. The urethra ran through the anterior part of the gland. Eight minutes were devoted to suture of the bladder and muscles, and drains were introduced. Two days later the drains were removed

and the remaining opening in the bladder was sutured. The man is making a rapid recovery.

We believe that the good results we have been fortunate enough to obtain have been due to the following facts:

1. No instrumentation to urethra or bladder before operation.
2. The use of nitrous oxide gas exclusively as an anæsthetic.
3. Rapid work.

The value of nitrous oxide gas and of rapid work in these old prostatic cases cannot, we believe, be overestimated. In two of the cases we owed the recovery of our patients to the fact that the operation was undertaken in two stages, and without the use of ether or chloroform.

NOTE.—Since writing the above paper, I have performed suprapubic prostatectomy under nitrous oxide gas for the eleventh time. Mr. J. L., sixty-six years old, was referred to me by Dr. F. Foerster. For seven years the patient had had complete retention, and had been catheterizing himself day and night. During these years he had had several attacks of cystitis and orchitis. The bladder had become progressively more irritable until the catheter had to be passed every hour day and night. During the three months prior to operation the patient's general condition had become much impaired, and he had lost fourteen pounds in weight. The urine was alkaline and contained considerable pus. The prostate, which was as large as a lemon, was removed in the usual manner. The bladder was trabeculated and contained several calculi, one of which was so firmly embedded in the wall of the bladder near the fundus that it had to be scooped out with a sharp spoon. The removal of this calculus through a perineal incision would, we believe, have been impossible. Convalescence was free from complications, the wound is healed, and the patient is able to hold his water several hours.

CONSERVATIVE PERINEAL PROSTATECTOMY.¹

THE RESULTS OF TWO YEARS' EXPERIENCE AND REPORT OF SEVENTY-FIVE CASES.

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THE time seems to be ripe for a study of results, and it is my intention to-day to give a summary of the results obtained by prostatectomy through the perineal route by the technique previously described by me. (*Journal of the American Medical Association*, October 24, 1903, February 4, 1905; *Monatsberichte für Urologie*, 1904, Band ix, Hefte 5, 6.)

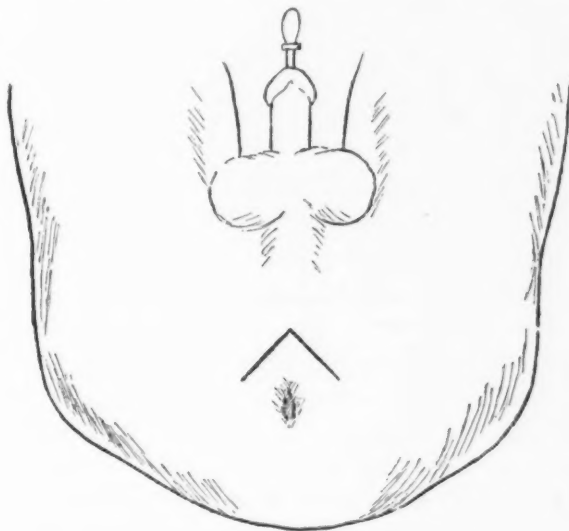


FIG. 1.—The inverted V cutaneous incision.

In these papers the technique of the operation has been so fully detailed that I will not now make a repetition of its

¹ Read before the New York State Medical Society, February 1, 1905.

various steps. Suffice it to say that the enucleation of the prostatic lobes is accomplished as shown in the accompanying drawings: Fig. 1 shows the inverted V cutaneous incision, each branch of which is about two inches long. This incision is simply carried through the fat and superficial fascia, the remainder of the operation proceeding by blunt dissection with the finger or handle of the scalpel, with the exception of those median line structures, the central tendon and recto-urethralis muscle which require division. In this way the posterior surface of the prostate is exposed with no more injury than through a median perineal incision, and one has the great advantage of being able to retract the rectum much better, thus giving a much closer and wider exposure of the prostate. The technique is not an "extensive dissection of the perineum" at all. Indeed, no important muscles are divided, and the wound heals as rapidly as a median one; in fact, it is the same, with the exception of the cutaneous portion.

Fig. 2 shows the retraction of the rectum, the exposure of the membranous urethra behind the triangular ligament, and the urethrotomy, performed on a grooved staff preparatory to the introduction of the tractor. (Fig. 3.) Great care should be taken to engage with sutures (or, better, with artery forceps) the mucous membrane of the urethra before attempting to introduce the tractor. After its introduction into the bladder, the blades are opened out (Fig. 4) and traction made, as shown in Fig. 5, thus bringing the prostate down into the wound, so that its posterior surface is presented. The capsular incisions which are made so as to leave the "median ejaculatory portion" undisturbed, as shown in Fig. 5, should be made about one and one-half centimetres deep, after which the external enucleation of the capsule (Fig. 6) and the internal enucleation of the urethra from the lateral lobes can be carried out with a blunt dissector. After the capsule and urethra have been thoroughly freed from the lobes, the deeper enucleation can best be done with the index-finger. In this procedure the tractor is often of the greatest service in drawing the prostate well into the wound, marking out the course

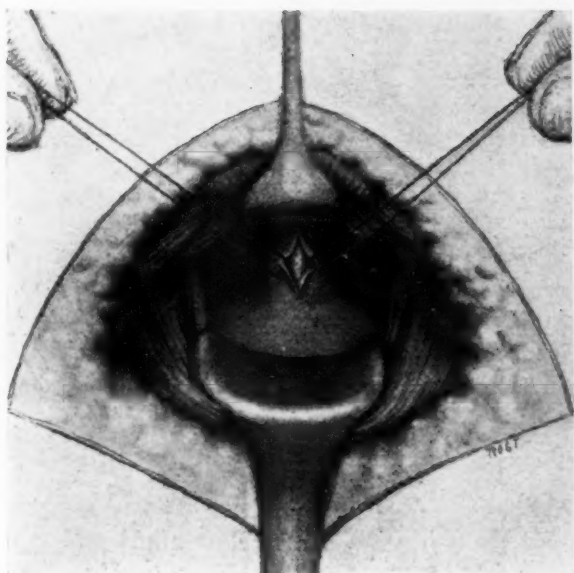
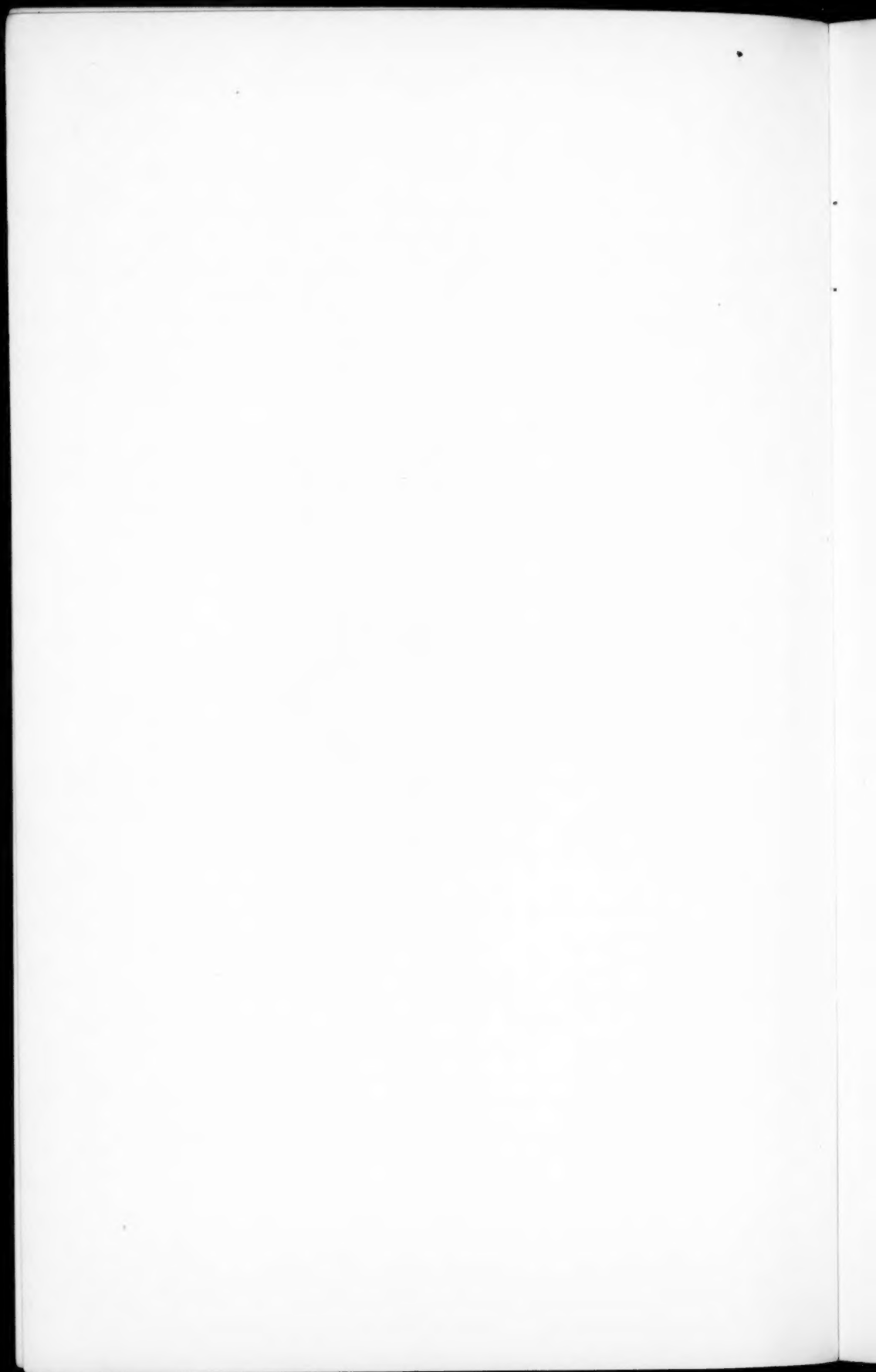


FIG. 2.—Opening of urethra on sound, preparatory to introduction of tractor.



of the urethra, and indicating when the enucleating finger approaches the vesical mucous membrane. The fenestrated blade is so easily palpated through the mucous membrane when the intravesical portion of a lateral lobe is reached, that one is at once placed on his guard and should rarely make a tear in the thin mucous membrane covering it. I now find the lobe



FIG. 3.—The tractor, closed.



FIG. 4.—The tractor, opened.

forceps, shown in Fig. 6, rarely necessary for the enucleation of lateral lobes, the tractor and finger generally sufficing. The use of ordinary forceps on the lateral lobes with traction generally leads to tearing them into multiple pieces. Each lobe should be removed in one piece, if possible. Morcellement is nearly always a poor technique to employ and unnecessary.

If a median lobe or bar is present, it can generally be removed by engaging it with one blade of the tractor, making traction and rotating at the same time. This will generally cause the lobe to present in the left lateral cavity (Fig. 7), where it can be engaged with the small lobe forceps, or, if it is too small for these, by some small toothed forceps, and enucleated or cut away with scissors.

If it is too small to be engaged with the blade of the tractor, this instrument may be removed and the index-finger of the left hand inserted through the dilated urethra and used as a tractor, as shown in Fig. 8.

In certain cases in which a fibrous median bar or lobe is impossible to remove by the technique described above (in which every effort has been directed to leave the "ejaculatory bridge" undisturbed), it may be necessary to deliberately cut through the capsule covering the ejaculatory ducts, and thus expose and enucleate or excise the median prostatic enlargement, as shown in Fig. 9. This can be done without cutting into or removing the urethral floor. The objections to this method are that it destroys the ejaculatory ducts and leaves the torn ends of the vasa deferentia opening into the wound, which nearly always becomes suppurative in a few days, thus inviting an ascending infection, epididymitis, etc.

I feel sure that the frequent occurrence of epididymitis in the cases of Albarran, Murphy, and others, is due to the fact that the ducts are destroyed, and their natural protective valve-like urethral orifices replaced by patent torn ends of the vasa opening into a suppurative cavity.

If a vesical calculus is present, it can be removed without tearing away the urethral mucous membrane by simply dividing the lateral wall of the urethra and dilating the vesical neck, as shown in Fig. 10. In this way I removed a stone measuring two inches in diameter. Although unnecessary, the divided urethral wall was sutured in this case.

In some cases simple dilatation of the prostatic urethra will suffice for the insertion of forceps and the removal of the stone.

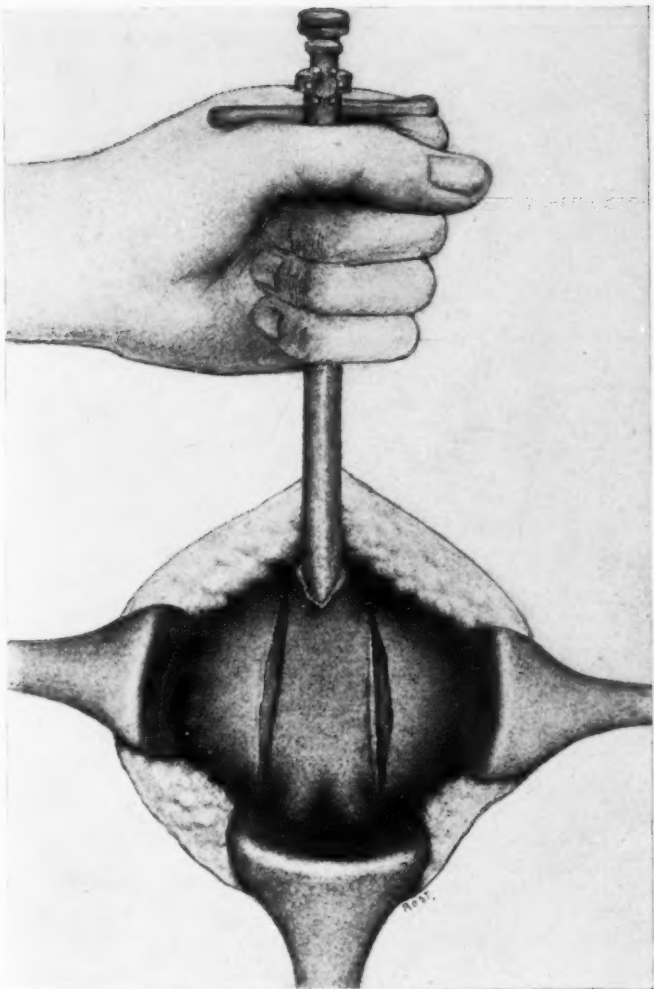


FIG. 5.—Tractor introduced, blades separated, traction made exposing posterior surface of prostate. Incisions in capsule on each side of ejaculatory ducts.

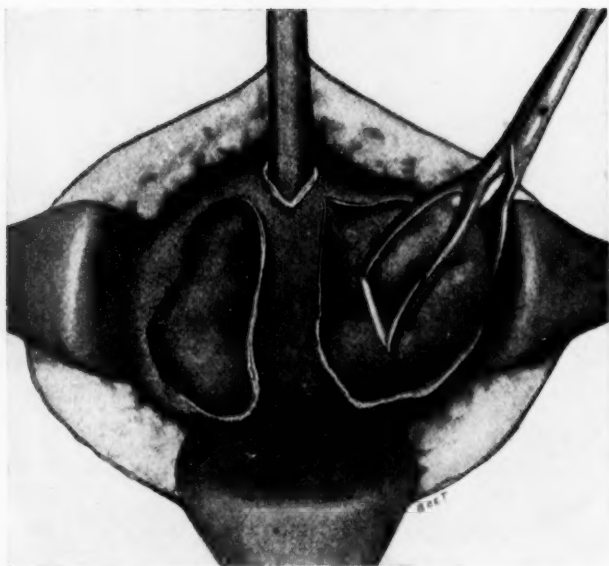


FIG. 6.—Enucleation of lobes. Forceps in position.



FIG. 7.—Showing technique of delivery of middle lobe into cavity of left lateral lobe.

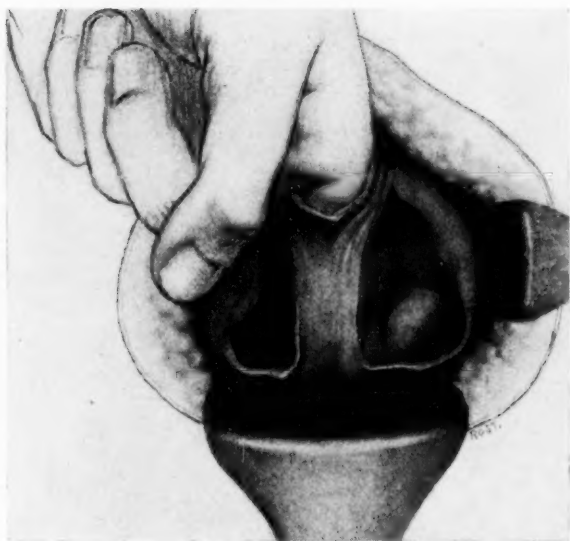


FIG. 8.—Showing use of finger instead of tractor to draw down small median lobe into lateral cavity.

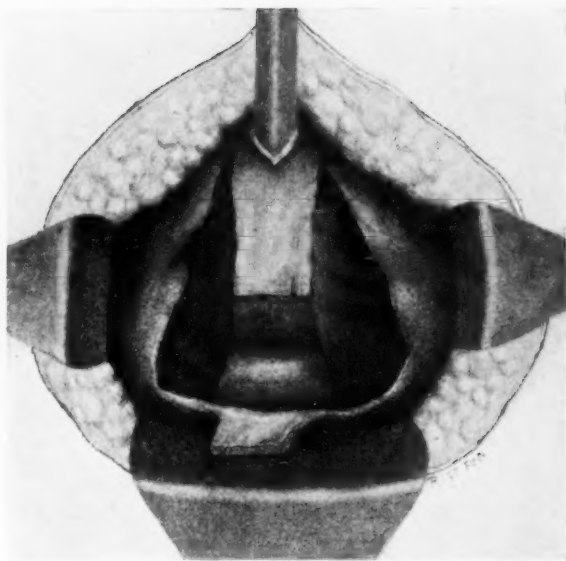


FIG. 9.—Showing suburethral method of enucleating median bar.

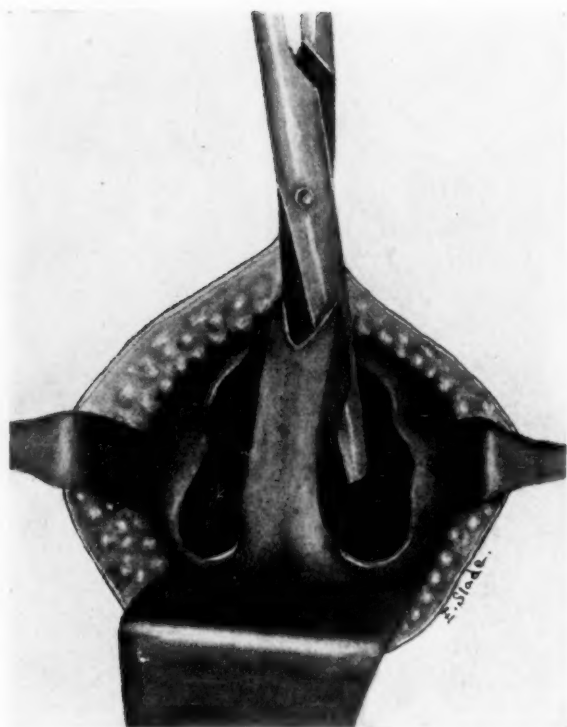


FIG. 10.—Showing division of lateral wall of urethra to allow extraction of large calculus through lateral cavity.

After completion of the operation upon the prostate, a double drain (two catheters tied together) is inserted into the bladder, fastened by a suture at the apex of the skin wound, and continuous irrigation begun. The lateral cavities are packed with gauze, but no extracapsular packing used.

The index-finger of the right hand encased in a rubber glove is then inserted into the rectum, and its anterior wall examined by palpation with the other index-finger. If the operator has been careful to divide the recto-urethralis muscle, and to hug the membranous urethra and capsule of the prostate, no injury should be found. It is nevertheless advisable to support the naturally thin rectal wall by drawing together the separated edges of the levator ani muscles, which form its normal covering. Only one catgut suture is necessary to thus restore the perineum and keep the rectum from being pressed upon by the packing, which is removed on the second day along with the tubes.

The after-treatment consists in abundance of water by mouth (or infusion), getting the patient out of bed as soon as possible, and avoidance of instrumentation.

Results.—During the past two years I have operated by this method 75 cases. Their ages were as follows: Over 80 years, 4 (81, 82, 82, 87). Between 70 and 79 years, 23; 60 and 69 years, 29; 50 and 59 years, 14; under 50 years, 5.

Mortality.—Among these seventy-five cases there were no deaths definitely attributable to the operation, in that all reacted well and convalesced satisfactorily for at least two weeks after the operation. I believe, however, that all deaths should be included, and therefore place in the mortality column the four deaths which have occurred.

CASE I.—Man aged eighty-one years, entered the hospital with a bladder holding about three litres, could not be catheterized, was aspirated for four days, perineal prostatectomy then performed, with satisfactory convalescence for three weeks. After that the patient gradually became uræmic and died five weeks after the operation.

CASE II.—Man aged seventy-two years, in good condition. Perineal prostatectomy, reacted well, out of bed and walking in a week, fistula closed under two weeks, and patient ready to go home. On fourteenth day patient in excellent condition, voiding urine naturally. High enema given on account of constipation; immediately afterwards sinking spell and death in a few minutes. Autopsy, pulmonary embolism. Bladder and kidneys in good condition.

CASE III.—Man aged seventy-six years, entered hospital with complete retention, nausea, vomiting, high fever. Had had nausea, vomiting, and symptoms of chronic uræmia for six months. Catheterization and drainage for about ten days, condition somewhat improved. Perineal prostatectomy, reacted well, after a few days recurrence of nausea, vomiting, inability to take nourishment for two weeks. Death. Autopsy, double pyohydronephrosis, ureters dilated to size of thumb.

CASE IV.—Man aged eighty-seven years. Very large prostate, patient in good condition. Perineal prostatectomy, patient reacted well. Walking during the second week, temperature normal, convalescence good. Sudden development of cough, fever, signs of bronchitis on twenty-first day after operation. Transferred to medical department. Rapid spread of consolidation, death on the twenty-fifth day. Double pneumonia.

In reviewing these cases, I feel satisfied that no other treatment could have saved Cases I and III, and that in Cases II and IV the operation contributed only indirectly to the development of the fatal disease.

Should the rule of one well-known prostatectomist "not to include patients dying after six days" be accepted as the criterion, I might here claim no mortality. I feel, however, that it is only right to include all cases. This series shows that the operation itself is practically free from mortality, other than such accidents as might follow any operation.

Restoration of Voluntary Urination.—Even when the catheter had been used for years, these patients are now able to void urine naturally in all cases. In only two of the seventy-five cases is there residual urine of any consequence, in both of which about 300 cubic centimetres still remain after urina-

tion. Of the other cases the highest amount obtained now by catheter is about thirty cubic centimetres.

The obstruction may be said to have been completely removed in all cases but these two. In one of these the cystoscope shows a small transverse fold of mucous membrane in the median portion of the prostate, in the other a small rounded intra-urethral lobule is to be seen. In both of these cases greater care at the operation would probably have detected and removed these obstructions, so that it may justly be said that normal free urination can and should always be established after the operation. In a number of cases, cystitis and contracture of the bladder exist, and more or less frequent urination is the result. These cases can probably be cured by hydraulic dilatation. If an unusual frequency of micturition is present after the operation, the patient should not be discharged without an investigation being made to see whether the bladder is markedly contracted or not, and if it is, treatment should be instituted to enlarge its capacity.

Continence of Urine.—In some cases urine was voided at intervals, with no period of incontinence, immediately after the removal of the drainage-tubes on the second or third day. As a rule, there has been an incontinence for several days, and in two instances a weakness in the sphincters was manifest, when the bladder became full, for several months. One of these is now well, and the other has no incontinence at night. No case of continual incontinence has occurred among these seventy-five patients.

In only one case has anything like a stricture of the urethra developed after the operation. In this case the median portion of the prostate was removed, as shown in Fig. 9, and in so doing, a portion of the floor of the prostatic urethra was accidentally excised. His physician reports that he found a stricture which was easily dilatable. I have not personally observed any case of stricture following the operation, and feel that the reported presence of only one case shows that instrumentation is entirely unnecessary as a routine procedure after the operation.

Preservation of Sexual Powers.—I have endeavored to hear from every patient, so as to find out what effect the operation has had on his sexual puissance.

I will tabulate the replies of those who claim to have had normal sexual powers before the operation. Of these:

Four were under 50 years of age. Three have erections and normal coitus; one has impregnated his wife; one has no erections.

Six between 50 and 59 years. Erections present, 5; coitus successful, 4; erections feeble, 1.

Fifteen between 60 and 69 years. Erections present, 10; coitus successful, 6; coitus not attempted, 4; erections not present, 5.

Six between 70 and 79 years. Erections present, 4; erections not present, 2.

Those cases in which the sexual powers were not present before operation need not be considered. A glance at the tabulation above shows that in a large proportion of the cases the erections and sexual puissance have been maintained after the operation. There are, however, a certain number of cases in which erections have not yet reappeared.

What effect the preservation of the prostatic urethra, the verumontanum, and the ejaculatory ducts may have upon erections and ejaculations can be surmised by a comparison of these results with those of Albarran and of Murphy, who cut away these structures in their operations, and have reported an absence of erections or sexual puissance in nearly all cases after the operation.

Fistula.—The perineal fistula has usually healed within two weeks. In a few instances it has closed within eight days. In only two cases that I know of has it persisted. In one of these the prostatic tissue removed has been found to be carcinoma.

Of the four cases of recto-urethral fistula which I reported in my last paper, all have, I am happy to say, been cured by subsequent operation. After failing in several attempts at closure, I have finally adopted the plan of supplying supra-

pubic drainage before closing the rectal and urethral openings separately. In this way the purulent urine is diverted from the sutured urethra, which is thus given a rest, and heals promptly. The suprapubic cystotomy adds nothing to the gravity of the operation, and has changed the results obtained from constant failures to constant successes.

These fistulæ occurred in men whose vitality was very poor (one had diabetes); but I believe that at least two would not have occurred but for the placing of packing against the unprotected rectum.

In the last thirty-five cases in which the levator ani muscles have been reapproximated by a catgut suture, and care has been taken to have no gauze press upon the rectum, there has been no case of rectal break-down.

In closing, I will say that after about 200 operations on account of hypertrophied prostate, among which were eighty-five Bottini operations with six deaths, twenty suprapubic prostatectomies with three deaths, I have come to the conclusion that for most cases perineal prostatectomy is the safest and surest and quickest method of curing the patient. That whereas the Bottini method is the simplest and quickest for a certain limited number of cases, which can best be determined by the cystoscope, it is not so safe, and nothing like so uniformly sure of relieving the obstruction as the perineal enucleation. The suprapubic route may be used in certain large intravesical lobes.

I wish to state again my belief in the great advisability of a careful preliminary cystoscopic examination. In this way only have I been saved from several serious blunders.

The recognition of diverticula, incarcerated calculi, pedunculated prostatic outgrowths, and early carcinoma of the prostate cannot be made without the cystoscope, and an accurate mapping out of the prostatic enlargements is of great advantage in performing a perineal operation where careful preservation of important and non-obstructive structures is the aim of the operator.

THE CAUSE OF INCONTINENCE AS A SEQUEL OF PROSTATECTOMY.¹

BY E. WOOD RUGGLES, M.D.,
OF ROCHESTER, NEW YORK.

A FEATURE of prostatectomy which has interested me greatly is the occurrence of incontinence, perhaps because the percentage of such cases has been rather large at Rochester.

One operator has performed twenty prostatectomies with one case of incontinence, another ten with one case, another seven with two cases, and two others one case each, one of these being followed by incontinence. Total, thirty-nine cases with five cases of incontinence, or 13 per cent. One of these cases recovered bladder control after three months and another after over two years, leaving three cases of apparently permanent incontinence, or $7\frac{2}{3}$ per cent., a rather high rate.

Francis S. Watson, in his admirable article on prostatectomy, published in the *ANNALS OF SURGERY*, June, 1904, gives a very complete *résumé* of the results and complications in 530 cases, and states the proportion of incontinence as $3\frac{1}{2}$ per cent., which is probably considerably below the true figure.

This phenomenon has been variously explained. Lilienthal, in commenting upon Gibson's case of incontinence, reported at the New York Surgical Society, April 8, 1903, said that "Incontinence often occurs for weeks and months, when the control has been good immediately after the operation." His theory is that "The scar formed at the neck of the bladder and in the urethra is at first succulent and forms a good valve. Then the cicatrix becomes hardened, causing the formation of a rigid, patent, urethral tube, permitting the urine to enter the deep urethra, and dribbling results. Later on the scar atro-

¹ Read before the Medical Society of the State of New York, February 1, 1905.

phies and again softens, and full control is once more regained."

The varying duration of the time required for recovery, ranging from two or three weeks to as many years, seems to me to combat this theory, and other points make it absolutely untenable.

Professor James E. Moore, of Minneapolis, in the *ANNALS OF SURGERY*, March, 1904, says that "Incontinence after prostatectomy is due to injury to the muscles or the nerves or to the neck of the bladder, most often the latter; that a careless or inexperienced operator may very easily tear away that portion of the sphincter of the bladder just below the urethra and in front of the third lobe, which would be very liable to be followed by incontinence."

George Woolsey, in discussing the three cases of incontinence reported by Parker Syme at the New York Surgical Society, November 13, 1901, said that the occurrence of incontinence may be partly explained by assuming that the fibres of the prostatic urethra were torn and not properly repaired.

If injury to the vesical neck, or prostatic urethra, or both, is the cause of incontinence, how can we intelligently explain the remarkable results of Moynihan, of Leeds, who intentionally removes the entire prostatic urethra, and of Freyer, of London, who has been forced to do the same in several of his cases, yet without the occurrence of incontinence.

In one of the cases operated upon at Rochester, there was a great deal of laceration of the tissues during the operation; the patient did very badly thereafter, being at the point of death for two weeks, and large sloughs, including a great deal of the bladder wall, one piece of mucosa being nearly three inches in diameter, came away, so that the attending physicians estimated that at least one-third or one-half of the bladder sloughed away. Yet this man was never troubled by incontinence.

Now it seems to me that the premises in the above reasoning are entirely incorrect and misleading. The mechanism of

urination and the significance of the two-glass test of the urine have apparently been quite forgotten.

We all know, or ought to at least, that the vesical sphincter is a comparatively weak muscle, and that the only muscle, by the action of which we are enabled to resist a strong desire to urinate, is the external sphincter or compressor urethræ, which is a strong, voluntary muscle, surrounding the urethra, in the space between the two layers of the triangular ligament, its anterior margin forming the boundary between the anterior and the posterior urethra.

In health, as soon as three or four ounces of urine have collected in the bladder, the vesical sphincter relaxes and permits the urine to pass down, filling the posterior urethra, until it meets the resistance of the external sphincter. The function of the vesical or internal sphincter is then at an end until after the next act of urination.

Often, restrained by circumstances or by false modesty, men hold their urine until the bladder is so distended that its strong muscular wall is paralyzed, and it becomes impossible to pass the urine at all, or only by dribbles. This vigorous power of resistance is wholly due to the external sphincter.

It is then evident that we must look farther and search deeper for the true cause of incontinence in these cases. Paralysis, partial or complete, of the external sphincter must be present, in order to explain it satisfactorily.

When we seek to ascertain the nerve supply of the external sphincter, we are met at once by contradictions. Gerrish and Morris give its supply as derived from the dorsal nerve of the penis, a branch of the pudic nerve. Gray and Cunningham give as its supply a branch of the deep or muscular division of the perineal nerve, which is derived from the pudic. Von Bardeleben gives its supply as a branch of the superficial division of the same perineal nerve.

According to Dr. George Woolsey, all these nerves are safe in the median incision of Syms and others, the lateral incision of Von Dittel, and also in the inverted V of Young,

unless the angle of the V is placed far forward and the arms diverge very greatly, which probably rarely happens.

But, where such difference exist, it is at least conceivable that possibly neither of these authors is correct, and that a branch, whose course is nearer the prostate, is its real supply.

It seems to me that either this theory of a nerve supply of the external sphincter, running close to the prostate, and sometimes injured in the strenuous manipulations attending its removal, must be true, or else the injury must be looked for in the operation on the membranous urethra itself. This is accompanied, nearly always, by great stretching and tearing of the posterior urethra, sufficient to permit the exploration of the bladder with the finger, the passage of instruments and even the extraction of calculi. In these manipulations, especially at the hands of inexperienced or bungling operators, there is certainly great damage done to the external sphincter muscle, and, in addition, its nerve supply may be totally or partially cut off, especially if the incision is not made exactly in the median raphe.

If it be objected to this theory that, in a large proportion of cases, full bladder control is ultimately recovered, it is only necessary to refer to the fact that in many cases where an inch of nerve, or even an entire ganglion, has been resected, in the treatment of obstinate neuralgia, both motion and sensation have returned after a variable length of time.

Also to be considered is the fact that pressure is capable of producing paralysis. For instance, the very trifling pressure on the ulnar nerve produced by sitting in a chair with padded arms will, if long continued, cause, in some persons, an obstinate ulnar paralysis. It is quite conceivable that the rather violent operative procedures in prostatectomy may produce similar effects by extreme pressure for a short time.

Incontinence following simple external urethrotomy, where less cutting, dilatation, and laceration are practised, is, in my personal experience and reading, very rare.

My suggestions would therefore be that, if perineal prostatectomy is performed, the incision into the urethra should be

made as close to the prostate as possible, exactly in the median raphe of the compressor urethræ, and the utmost care be exercised to avoid stretching and laceration of the muscles.

But, judging from the statistics of Freyer and Moynihan, if one wishes to assure himself against the occurrence of incontinence, the suprapubic should be the operation of choice, unless decided contraindications exist, and, according to Freyer, there are no contraindications, if the patient is in a fit condition to undergo an operation of any gravity whatever. I have carefully read over the histories of his first 105 suprapubic operations, ending October 29, 1904, and following every case which survived is one of these two remarks, "Patient is able to retain and pass his urine naturally," or, "Untroubled by any urinary symptom."

It appears, however, to be a grave and needless interference to remove the prostatic urethra, according to Moynihan's method, unless absolutely unavoidable. Nature is capable of rectifying many defects in operative procedures, but it is certainly better surgery to leave intact the normal epithelial covering of the urethra, rather than to substitute one built up by granulation tissue, thus increasing the danger of sepsis and the liability to subsequent contraction.

I will advance another theory, according to which this, as a rule, temporary symptom might be accounted for, although I do not believe it to be the true one. It is certainly a wise provision of Nature that so important an outlet as the urethra should be put under the control of two, separate muscles, and that their action is so regulated that each of them does duty, alternately, for approximately half of the time. These periods of rest may be necessary to the perfect performance of their function. If so, it is readily comprehensible that the destruction or paralysis of the internal sphincter may produce incontinence, through paralysis of the external sphincter, caused by the lack of its normal periods of relaxation.

For this theory would speak the facts that this incontinence is rare during sleep, that it becomes worse towards evening, and above all that the muscle almost always finally performs

its function perfectly, generally in a few months, in the same manner as other organs which develop to meet additional work when thrust upon them.

Against it would be the very strong and probably decisive argument that in Freyer's and Moynihan's cases, where the whole prostatic urethra has been removed, not even temporary incontinence occurred.

The following statements in one of Freyer's articles certainly go far to prove the correctness of my theory. In describing the autopsy of a case, which died twenty-two days after operation from acute mania, he says, "The suprapubic wound had practically closed. There was nothing abnormal about the bladder, except that it was pear- or funnel-shaped instead of globular, the inner orifice of the urethra terminating at the triangular ligament. It would thus appear that, after complete enucleation of the prostate, the prostatic urethra, deprived of its normal support, widens out in funnel fashion and practically becomes part of the bladder cavity. *It further demonstrates definitely that the true sphincter of the urethra (or bladder) is situated at the membranous portion of the urethra.*" (Not italicized in the original.)

On February 4, three days after the reading of this paper, there appeared in the *New York Medical Record* an article by Dr. E. G. Ballenger, of Atlanta, Georgia, in which, among his "Conclusions," he states, "In the perineal operations carefully cut the central tendon of the perineum close to the rectum, but with the finger in it to avoid injury. Avoid laceration of membranous urethra, as incontinence of urine will follow." So far as I know, this is the only other published recognition of the fact that incontinence, after prostatectomy, is due to interference with the external sphincter muscle.

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THE CHOICE OF OPERATIVE METHOD FOR THE REMOVAL OF THE HYPERTRO- PHIED PROSTATE.

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THE satisfactory establishment of surgical efforts for the radical removal of urinary obstruction, caused by enlargements of the prostate gland, must be accepted as now thoroughly accomplished.

It is of interest to note, in surveying the literature of the subject, that among the many different methods of attacking the prostate that have been proposed by different surgeons, practically equally good results are reported to have been secured by the most diverse methods by men who had become specially skilled in their application. It cannot be, however, that the choice of a method is a matter of indifference, a question of chance or prejudice. In view of the frequency of the malady—every hamlet has its prostatics; wherever there are old men obstructive dysuria will be met with—the general recognition of the possibilities of operative relief will compel the frequent attempt on the part of the general surgeon to supply it. So that the question is no longer what is possible in the hands of the specially expert, but what, in the light of our present knowledge of the anatomical relations and the pathological changes of the prostate gland, will in the hands of the average surgeon most certainly and safely, wholly and permanently, relieve the obstructive dysuria that the prostatic disease has produced.

The question of *mortality* naturally takes precedence in the consideration of any operative proposition. There must of necessity be some mortality in any and every kind of surgical intervention in prostatic patients. Sepsis, renal insuffi-

ciency, and the multiple degenerations incident to old age are complications in varying degrees of combination, that have to be reckoned with in many instances, and which must determine a fatal exit inevitably in a certain proportion. The proper selection of cases and the due preparation of them for the hazards of operation will always engage the earnest attention of the surgeon, and by these means the rate of mortality will be kept at a minimum. With the demonstration of the comparative safety and certain benefits of operation will come a resort to it much earlier in the course of the disease than has hitherto been the case, with which will come a marked diminution in its hazards and a corresponding lowering of its death-rate.

It has not failed of notice that total removals of the gland, by whatever method, have been attended by a smaller mortality than have partial removals of obstructing parts. In other words, the wider open the door which has been left for the free exit of infective materials, the greater the freedom from subsequent septic complications. In this matter of drainage, as in all other precautions which pertain to serious surgery in any part of the body, operations upon the prostate are governed by the well-established dicta of general surgery.

At present, it would seem that a surgeon must expect a death-rate after prostatectomy of from 5 to 10 per cent. While he may in some instances possibly have the good fortune to have a considerable series of cases without a death, yet a longer continuance of work has been found even in the experience of the most careful and fortunate to be attended with a share of mortality.*

* The following recent statistics are of interest as examples of unusual immunity from mortality: *Small median perineal incision; finger enucleation unaided by sight:* Goodfellow, 78 cases, 2 deaths; Murphy, 51 cases, 1 death; Syms, 33 cases, 2 deaths. *Free transverse perineal incision; visual control of enucleation by finger and instruments:* Young, 75 cases, 4 deaths; Albarran, 59 cases, 2 deaths; Hartmann, 36 cases, 2 deaths; Proust, 30 cases, 0 deaths; Pauchet, 20 cases, 1 death; Rafin, 20 cases, 1 death. *Total enucleation by finger unaided by sight through suprapubic opening in bladder:* Freyer, 107 cases, 5 deaths.

Expectation of Cure.—Second only to the question of mortality is that of expectation of cure. The primary indication is the re-establishment of the ability of the individual to readily, fully, and painlessly evacuate his bladder. With regard to the restoration of normal function it must not be forgotten that the statements both of patients and of surgeons should always be considered as relative. Prepossession and enthusiasm often lend a rose color to the reports of results, and a more close scrutiny of real conditions may often elicit information as to attendant infirmities which really modify the result. Nevertheless, even with these modifications, the fulfilment of the supreme indication, viz., the removal of the urinary obstruction, is a sufficient achievement to obscure the presence of many lesser evils. With these reservations, the accumulated experience of the past ten years is that in more than 60 per cent. of the cases that have been subjected to total prostatectomy, the ability to empty the bladder spontaneously has been restored, and has been maintained permanently, so that the use of a catheter has been no longer necessary; there was but little, if any, residual urine, and the quality of the urine has become fairly normal. Coincidentally, the general health has greatly improved. In a very large proportion of the remaining cases a marked improvement to the obstructive symptoms has resulted; the amount of residual urine has decreased; the intensity of the cystitis has diminished, and the frequency of catheterism has been lessened, and the facility of passing the instrument has been increased.

The infirmities which claim acknowledgment as possibly frequently modifying the perfection of the result are, *Impotence, Urinary Incontinence, Epididymitis and Orchitis, Fistulæ, Stricture of the Urethra.*

I. *Impotence.*—The removal of the posterior central segment of the prostate through which the ejaculatory ducts pass on their way to their openings of discharge into the prostatic urethra necessarily carries with it a greater or less extent of these ducts, and entails the later cicatricial obliteration of the duct stumps left behind. It is obvious that in attacks upon

those forms of obstructive overgrowth in which middle lobe hypertrophy is a determining factor, such injury to the ejaculatory ducts is very probable, and often inevitable, except when special precautions are taken to preserve them.

The experience of surgeons in operative attacks on the prostate thus far has shown, however, that in a very considerable proportion of cases that come to operation, the obstruction is not due to large median tumors. In my own work, of twenty-three cases thus far operated on, in but eight of the entire number was the hypertrophy attended with marked median enlargement. In eight of them the lateral lobes were chiefly and but moderately enlarged, and in the remaining seven the prostatic overgrowth was of the hard, firm, fibrous variety.

The practical bearing of this observation upon the subject of inquiry is this, that in the denser specimens of such prostates not at all, and in the mixed forms only to a limited degree is enucleation of tumor masses possible, and their removal is best accomplished by systematic dissection or morcelllement with the help of forceps and scissors; and if it is possible to so direct these procedures as to spare the posterior central ejaculatory ducts bearing segment, the likelihood of the production of impotence as a consequence of the operation would be lessened.

Horwitz,* however, has advanced the theory that impotence may follow prostatectomy independently of any wound or resection of the ejaculatory ducts, due to the disturbance of the important nervous mechanism of the gland by the operative injury inflicted on the gland as a whole. He calls attention to the fact that cases are constantly met with of chronic disease of the prostate in which sexual debility is a marked symptom, in which the ejaculatory ducts and seminal vesicles are healthy. His conclusion is that any surgical interference with the prostate gland in men of advanced years, whose sexual

* Horwitz. Radical Cure of Senile Hypertrophy of the Prostate Gland. New York Medical Journal, 1904, August 6, 13, and 20. Reprint, p. 30.

vigor is already either on the decline or in abeyance, would be likely to result in sexual exhaustion. While it is true that prostatic dysuria is more frequently met with in men in whom, by reason of their age, sexual vigor is in the decline or is already merely a memory, nevertheless the instances are not infrequent in which the disease develops at an age when virility is still well preserved. The question of impotence, caused by operation, must loom up large to such a man when called upon to decide whether he shall submit to a prostatectomy or shall enter upon or continue a catheter life. When, however, the catheter life has come to its inevitable end, and the question is simply one of the preservation of life and the obtaining relief from an intolerable suffering, then the question of impotence or of other mere infirmities becomes insignificant.

In the case of men still possessing fair sexual vigor, it is evident that the surgeon, keeping in view always the prime indication for the full and absolute removal of obstruction, so as to ensure a permanent ability to spontaneously empty the bladder, should adopt an operative technique that will avoid as far as possible injury to the ejaculatory ducts. While in many cases this will be impossible, and they must be swept away in the fulfilment of more imperative indications; while in yet others the damage to the sexual apparatus, independent of the continuity of the seminal ducts, may so disturb the possibilities of erection and intromission as to produce a condition of practical impotence; there yet remains a very considerable proportion of cases in which the preservation of sexual vigor is to be expected, as the result of the adoption of suitable methods of operative technique.

Urinary Incontinence in some degree is an occasional result of prostatectomy, whatever the operative method employed. Some defect in the ability to retain urine in the bladder is to be expected during the first weeks after operation. As a rule, however, after a few weeks, or months at farthest, complete control over the bladder is regained. In a small proportion of cases some lack of control persists indefinitely, causing urinary leakage when moving about, or at times when

asleep, or whenever the bladder becomes somewhat distended, or when the individual is fatigued. It is impossible as yet to secure reliable data on sufficiently large scale to permit of the formulation of percentage calculations of any value as to the relative frequency with which permanent incontinence in some degree follows the operation. It is, however, an infirmity which is of little magnitude by the side of the serious malady for which it has been substituted.

Epididymitis and Orchitis frequently develop in the early aftercourse of cases of prostatectomy, as the result of infection transmitted from the prostatic site. It not infrequently is immediately excited by the passage of sounds after the removal of the primary drainage-tubes, but it may also arise without the intervention of any such instrumentation. In my own twenty-three cases this complication has appeared in six instances. It is usually slight in degree and unimportant in its relation to the convalescence; but in two of my cases it went on to supuration.

Fistulæ.—Suprapubic fistulæ, perineal fistulæ, and recto-urethral fistulæ are among the occasional sequelæ of operation for the removal of the prostate. They occur with sufficient frequency to make their mention necessary in any complete consideration of the subject of prostatectomy, but yet so rarely as to have very little practical bearing on the prognosis of a given case. In the absence of great loss of substance in the original wound, the failure of a suprapubic or perineal opening to close is usually due to some contraction in the anterior urethra, and, as a part of the cares in any given case, the surgeon should secure perfect freedom of the urethral lumen throughout its whole extent.

Recto-urethral fistulæ may result either from an accidental tear through the anterior wall of the rectum in the course of the efforts to expose the prostate or from later sloughing consequent upon intense local infection, or from drainage-tube, or tampon pressure. The very close relation of the prostate and the rectum at once suggests the difficulty of separating them without injury to the rectum, and the possibility of such injury doubtless had much to do in discouraging earlier

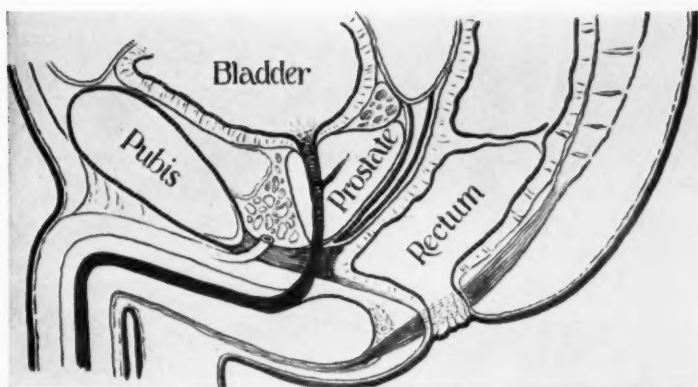
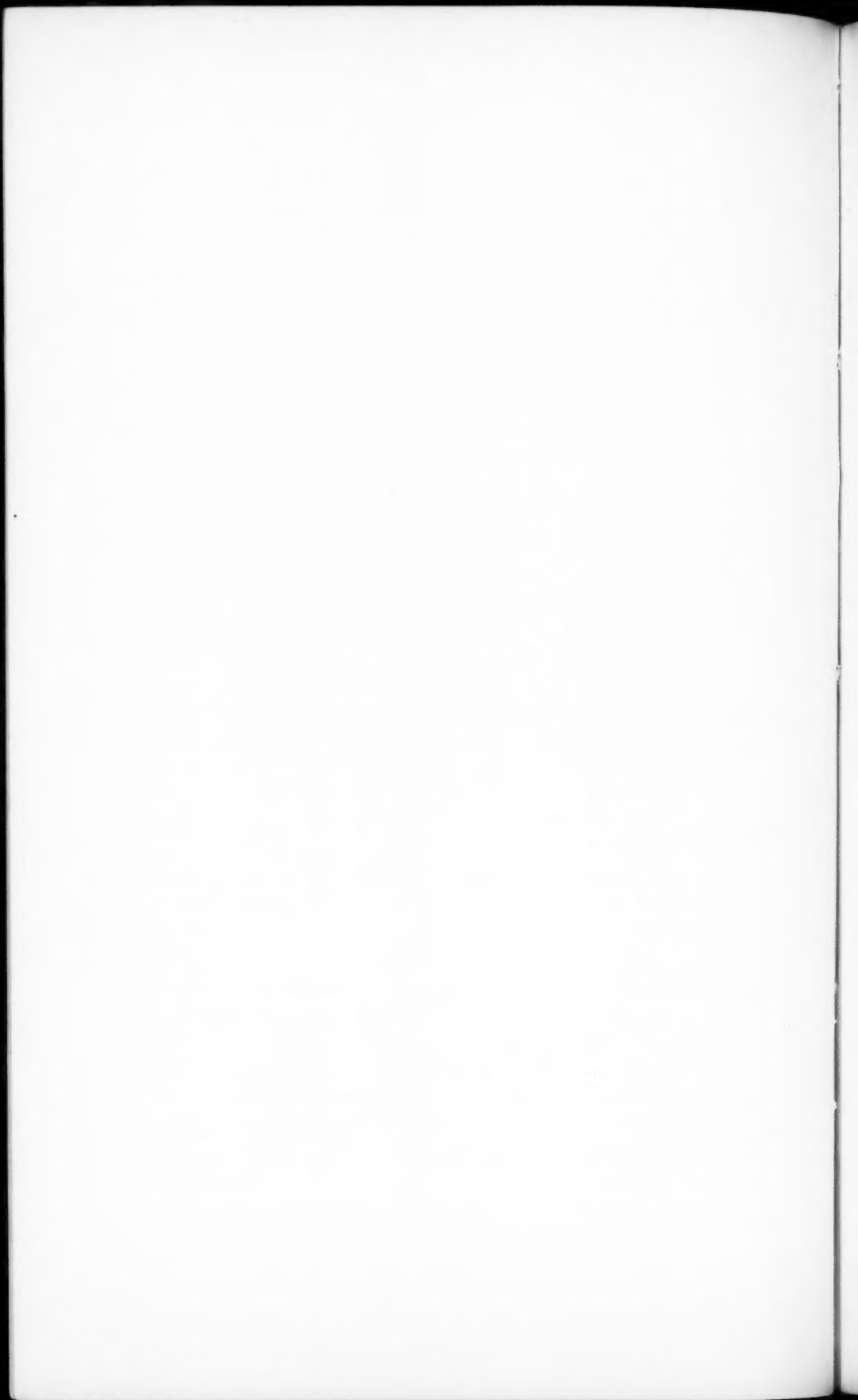


FIG. 1.—Diagram to illustrate surgical relations of prostate to rectum and perineum. (Modified from Proust.) Note especially the space between anterior wall of rectum and interior surface of prostate; note the drawing of the suprasphincture part of the anterior wall of the rectum towards the urethra and pubis by the recto-urethralis muscular fibres; note the projection into the perineum of the bulk of the corpus spongiosum penis.



attempts on any general scale to attack the prostate. Fortunately, however, between the capsule of the prostate and the underlying musculofibrous external coat of the rectum there is an appreciable layer of loose connective tissue which forms a line of easy cleavage, so (Fig. 1) that when once the capsule of the prostate has been exposed, the further stripping back of the rectum to any degree that may be necessary is comparatively free from danger of injury to the rectum. It is that portion of the rectum which is anterior to the prostate, and which is pulled forward towards the membranous urethra by the recto-urethralis muscular fibres, which is most likely to be the seat of injury when the prostate is approached from the perineum. With care and due attention to the anatomical relations of the structures involved, this point of danger may usually be avoided; but it is quite conceivable that in occasional instances the relations and texture of the perineal structures may be so altered by fibrotic or inflammatory changes as to make the desired detachment and pushing back of the rectum without injury very difficult to accomplish. That such injury has occurred at the hands of many able surgeons is a matter of record, and it is not unreasonable to believe that not all the instances in which it has occurred have been published.

In my own earlier experience such injury to the rectum occurred twice as the result of misadventure in the course of the effort to expose the prostate, both times in cases of small fibrotic prostates with increased rigidity of the recto-urethral muscular mass. In a third case an opening into the rectum occurred fourteen days after operation, as the result of a slough due to wound infection. In two of these cases the fistula was subsequently completely repaired by plastic operation; in the third case, a plastic failed to close the fistula and, other circumstances having prevented its repetition, the fistula persisted, during the remaining two and a half years during which his life was prolonged, about two-thirds of the urine passing into the rectum at each urination, requiring the man to sit upon the stool to void it.

Urethral Stricture does not seem to have followed to any serious degree the extensive lacerations and removals of the

prostatic urethra which have marked many of the operations upon the prostate. It has been frequently the case that the entire prostatic urethra has been taken away with no subsequent disturbance of the urinary functions. Extensive tearing away of the prostatic urethra has accompanied, certainly in some, and probably in most, if not all, the extensive enucleations done by the suprapubic route; a varying degree of injury to the floor and lateral walls of the prostatic urethra attends most of the perineal methods of operation. The claims of many operators, who remove prostatic masses guided by the sense of touch alone, that very limited injury of the urethra results from their manipulations, are not sustained by our knowledge of the anatomical conditions of the parts. The urethra in its course through the prostate does not present such distinct layers in its walls as are found in its membranous and penile portions; nor does it present any such recognizable layers as does the capsule of the gland from which the adenomatous masses of an enlarged organ can be readily peeled away. It consists of a few layers of columnar epithelium resting on a base composed of connective tissue and muscular fibres which are directly continuous with the stroma of the gland itself, and surround and support likewise the score and more of ducts to which the primary lobule outlets converge, and which open upon the floor of the urethra, and which also are lined by an extension of the urethral epithelium. (See Fig. 4, page 484.) In other words, the submucous and muscular coats belonging to the urethra in other parts of its course are here replaced by prostatic substance. It seems to the writer that the laceration of the urethral wall by attempts to tear out more or less of the glandular substance external to it can be prevented only by the most careful and delicate manipulation, conducted in full view and with the assistance of careful dissection as the enucleation approaches the vicinity of the urethral wall. The periphery of these prostatic masses can readily be enucleated from the capsule with a blunt dissector or with the finger-tip; but upon the urethral side of the mass the condition is different. They can be readily torn away, it is true;

but the operator who thinks that in effecting this he leaves the prostatic urethra intact is probably mistaken. More emphatically is this the case in the presence of the hard fibrous prostate.

It may be well, therefore, to accept as one of the usual accompaniments of prostatectomy, as a surgical procedure, a very considerable laceration and loss of substance of the prostatic urethra. In view of this, the fact of its regeneration becomes one of considerable surgical interest. When the roof and a considerable portion of its lateral wall is left after the enucleation is completed, it is natural to expect that the conditions suffice to insure a patent mucous-lined canal as wound-healing progresses; in those other cases in which nearly complete enucleation of the whole gland *en masse*, bringing with it a considerable segment of the whole circumference of the urethra, is effected by attack from within the bladder there remains an irregular, but in general a funnel-shaped, cavity, into which the bladder mucosa must prolapse, and as the process of repair progresses furnishes an advancing line of epithelium to cover any raw surface still present. From the end of the membranous urethra likewise a similar epithelial ingrowth may contribute to the ultimate result; from the ducts and lumina of any of the gland substance that may have escaped the surgical attack an additional source of epithelium may be presented. This may explain why the possibility of speedy regeneration of an adequate epithelium-lined canal through the eviscerated prostate has been demonstrated by abundant clinical experience. The very natural apprehension, entertained by many, that intractable stricture would be a common sequel to these operations has not been realized. In order to secure this immunity from later stricture, it would seem that the urethral lesions must be restricted to the prostatic portion of the urethra. It would seem also a sound surgical procedure in all cases to place a good-sized rubber drainage-tube into the bladder through the prostatic hiatus during the early days after operation, to be replaced later, possibly for a week or more, by a catheter *à demeure*; this, in addi-

tion to the advantages of drainage, for the purpose of favoring and controlling the formation of a suitable channel, along which the process of epithelial proliferation shall extend. The occasional use of a full-sized sound may be adopted as a substitute or a succedaneum to the catheter for a time in the after-history of such a case.

INDICATIONS FOR OPERATION.—In the preceding observations the attempt has been made to make as full and just a statement as present experience allows of the expectation of life and degree of cure in cases of prostatic dysuria properly to be expected from the various methods of removal of the obstructing masses. In view of the results narrated, it would be impossible to overstate the magnitude of the benefits which direct surgical attack now offers, remembering the frequency of the complaint, the suffering and disability imposed by it, and the certain disastrous ending to its palliation by catheterism. In adding this latter observation as to the perils of catheterism, the writer desires to avoid exaggeration. It is granted that in many instances for a prolonged period the habitual use of a catheter is well tolerated, in some instances by reason of scrupulous attention to asepsis in its use, but more frequently as a result of a special immunity against bladder infection possessed by the individual; but even in the most resistant of individuals cystitis sooner or later develops, and with this the whole train of symptoms and conditions which are included under the term of *prostatism*. Notorious is the liability of such catheter subjects to attacks of prostatic congestion, whereby the possibility of the facile introduction of the instrument is destroyed for the time, and the sufferings and dangers of acute complete retention of urine are precipitated.

It has long been recognized that the degree of obstruction bears no necessary relation to the size of the prostatic enlargement. Senile degeneration of the bladder wall, lessening the expulsive power of the bladder, may be an important factor in the final breakdown. This may be, and often is, associated with fibrotic contracture at the neck of the bladder, lessening the facility with which it relaxes to permit the outflow

of urine, and thus disturbing the balance of the expulsive mechanism of the bladder and leading to the development of pouching of the bas-fond and the formation of a retroprostatic lip or bar. As a part of this process, the prostate also presents a relative increase in its fibrous elements, with or without glandular increase, and adds its element of obstruction to the complex of conditions. Whatever the special condition present, the dominating feature of all these cases is *urinary obstruction*. Whenever this is present to a degree that materially interferes with the comfort of the individual, or entails notable disability; if examination shows that the bladder never wholly empties itself, and especially when crises of complete retention have occurred, all of which are reasonably traceable to prostatic obstruction, then it would seem as if indications enough had been presented to justify resort to prostatectomy.

Shall not the use of the catheter first be tried? Certainly as a temporary resort, but in the light of present experience always rather under protest than as a measure possessing the full recommendation of the surgeon.

Doubtless in many cases operation on the first appearance of serious obstructive symptoms will be impracticable, either through the disinclination of the patient to submit to such an operation as prostatectomy, or his inability to give up from his occupation the time required for its performance and recovery thereupon, provided the use of the catheter is found to be unattended with any special trouble or discomfort; nevertheless, it is impossible to emphasize too much the great difference in the risks, both as regards danger to life and probable perfection of cure, of operations done early before the inevitable bladder, ureteral, and kidney infections have developed, the sure ultimate consequences of the use of the catheter, and of those which have to be done as a last resort in the presence of some or all of these conditions.

The particular indication for prostatectomy to-day, therefore, is a degree of urinary obstruction that interferes materially with comfort or entails notable disability, which exami-

nation demonstrates with reasonable certainty to be due to enlargement of the prostate or to fibrotic changes in its texture.

Prostatic dysuria declared, the question of contraindications to operation must rather be the ones for consideration, if such exist, which may outweigh or modify the primarily dominating indication.

Great age, if with it catheterization be facile and comfortable, might properly be a reason for resort to the catheter during the brief period of life remaining, rather than subject the patient to the special immediate hazards of operation.

Great age, however, is a very relative term; many men are older at seventy than others at eighty. Septuagenarians and octogenarians often bear operations well, if they are not subjected to too much loss of blood, and are soon gotten out of bed. In my own experience, one of the most satisfactory results was obtained in a gentleman of eighty-four years, from whom a median and unilateral mass weighing two and a half ounces was enucleated. Twice I have removed the prostate from men of seventy-eight years with happy issue. In eight other cases, whose ages ranged from seventy-one to seventy-four years (seventy-one, seventy-two, seventy-two, seventy-two, seventy-two, seventy-three, seventy-three, seventy-four), the course of recovery has been equally smooth, with the exception of one case in which death quickly followed operation from postoperative pulmonary congestion. On the other hand, the only other death in the whole series was in the person of the youngest patient of all, a man fifty-seven years of age, who died uræmic on the seventh day after operation.

Advanced kidney lesions are the most frequent conditions that may contraindicate any serious operative procedure, requiring the surgeon to be content with the continued use of the catheter, if practicable, or, if not, with a rapidly executed suprapubic section for drainage, under cocaine.

Profound general depression resulting from prolonged suffering, loss of sleep, and septic absorption may contraindicate prostatectomy. In some cases a proper combination of

drainage, perineal or suprapubic, with bladder irrigations, the removal of calculi, if present, urinary antiseptics, sedatives, and general hygiene, may so improve the general and local state of such patients as to make later prostatectomy possible and curative.

Any of the conditions of the other organs or of the general state of the body which are recognized by surgeons in general as contraindications to operations must be taken into the account when considering the surgery of the prostate, and given that weight which all the circumstances indicate.

TREATMENT PRELIMINARY TO OPERATION.—Prostatectomy is not an operation of emergency, and should be preceded in all cases by those general cares accepted in all serious surgical work as desirable to secure the best state of bodily vigor. Sleep should be secured by opiates, if needed. The digestive tract should be cleansed and regulated by suitable aperients and diet; the kidneys should be flushed by copious draughts of water; the skin should be depurated and cleansed by hot baths; the bladder should be drained by a retained catheter and its mucous membrane treated by accepted methods. The urine should be made antiseptic by the administration of urotropin in half-gramme ($7\frac{1}{2}$ grains) doses four times daily. The rectum should finally be emptied by an enema administered nine or ten hours before the hour set for the operation.

Whether cystoscopic examinations of the bladder shall be made or not will depend very much on the habit and personal prepossession of the surgeon. It is denounced by many operators as an unnecessary tax upon the endurance of the patient, liable to aggravate the local prostatic and bladder irritation, and giving no information that cannot be better obtained in the course of the operation, the necessity for which is sufficiently demonstrable without its use. On the other hand, it is claimed by its advocates to be capable of giving very important information needed for the guidance of the operator.

The sympathies of the writer are with those who deprecate the routine use of the cystoscope in these cases.

CHOICE OF OPERATION.—In operating for prostatic dysuria, the problem which the surgeon has to solve is not only to thoroughly remove the obstruction, but to do it without undue prolongation of manipulation and with as little loss of blood as possible, and with a minimum amount of injury to the urethra, bladder, rectum, and ejaculatory ducts, thereby lessening mortality and subsequent infirmities. At the present time three methods of attack present themselves for choice: 1. Through the bladder by means of a suprapubic section; 2. By the perineum through a limited longitudinal median incision carried into the capsule of the prostate. In both of these methods enucleation of prostatic masses is effected by fingertip dissection unaided by sight; 3. By the perineum through a free transversely curved incision, through which the prostate is fully exposed, followed by systematic incision into its substance, and subsequent enucleations largely under the guidance of the eye.

In the first two methods named the amount of time required in the manipulation, in favorable cases, is distinctly less, and it is conceivable that in some cases this indication of quickness of execution may determine the choice. Cases characterized by massive gland hypertrophy are the most favorable for the transvesical method; those in which the hypertrophy is moderate lend themselves better to one of the perineal methods; those in which there is a marked fibrotic element in the prostatic change always require for their satisfactory management recourse to the most open method of attack possible. Cases in which a suprapubic opening has already been made for the removal of calculi or clots, or for bladder drainage, and in which a well-marked intravesical projecting mass is felt, will naturally invite attack through the bladder. And in the absence of any important indication to preserve the ejaculatory ducts, should be so treated. Cases with massive intravesical growth, and in which the use of a general anæsthetic is contraindicated,—as in certain renal and cardiac conditions,—but in which operation may still be justifiable under spinal cocainization, may better be attacked through the bladder. A hard

fibrotic prostate should not be subjected to any form of prostatectomy under such conditions; but in such a complex of conditions the Bottini method of galvanocautery incision would find its special field. In the great majority of cases, however, there will be nothing to prevent the surgeon from resorting to such method of procedure as in his judgment will best satisfy all the requirements of an ideal operation. In the earlier sections of this paper, the writer has attempted to critically examine the operative indications which prostatic dysuria presents. He will not attempt to again marshal them here, even in review, but will content himself with the statement of his conviction from their study that, as a rule, for the best fulfilment of all the operative indications, there is necessary the free exposure of the gland by suitable perineal incision; the exposed gland should be brought down as much as possible into the superficial operative field by the use of suitable tractors, and the removal of the obstructing masses should be carefully and systematically effected under the guidance of the eye as much as possible. There is surely nothing in the special conditions of the prostate to take its surgery out of the application of that tenet of general surgery which demands the adequate exposure of the affected part as the first step of any attack upon it. That the additional time which this method of procedure takes adds but little, if anything, to the hazards of the operation, experience has already fully demonstrated (*vide* the mortality tables given on page 566), while it will add very much to the definiteness and certainty of the result.

Choice of Anæsthetic.—In general, chloroform is to be preferred as the general anæsthetic of the aged, on account of the less tendency to bronchial irritation and pulmonary congestion which follows its use. In cases in which even chloroform is manifestly extra-hazardous, it has been shown by Wiener that operation through the bladder may be done with safety under nitrous-oxide gas anæsthesia. Young* has

* Young. Perineal Prostatectomy. Journal of the American Medical Association, February 4, 1905.

reported ten cases in which perineal prostatectomy has been readily effected by the use of spinal cocainization, without any unpleasant sequelæ in any case, and Tinker * has demonstrated in two instances the feasibility of removing a hypertrophied prostate under local anæsthesia by tissue infiltration with solution of eucain and adrenalin.

TECHNIQUE OF THE PERINEAL OPERATION RECOMMENDED.—*a. Before the Incision.*—The patient is placed on a firm table in an exaggerated lithotomy position, the pelvis elevated, by sand bags or other special supports, to a degree that will bring the plane of the perineum as near horizontal as possible (Fig. 2). The rectum should have been emptied by an enema administered at least eight hours before the hour of operation, and now should require no attention. The scrotum, perineum, and adjacent thigh surfaces having previously been shaved and cleaned, should again be scrubbed and disinfected after the patient has been placed in position. A full-sized sound, No. 26-30 (French), should now be introduced through the urethra into the bladder and held by an assistant. Should any strictures in the anterior urethra be detected, they should be freely divided by urethrotome at this time. The sound in the urethra should not be made to project into the perineum, but should be raised so as to bring the membranous urethra as close as possible to the pubic arch and increase the distance between the urethra and the rectum (Proust).

b. The Primary Incision.—A curved incision through skin and superficial fascia is then made, distant an inch to an inch and a half in front of the anus and extending from ischium to ischium (Fig. 3).

c. The Exposure of the Recto-urethral Muscle.—This is a step of the highest importance, since this semi-aponeurotic muscle is the only real barrier in the way of free access to the

* Tinker. Bloodless Perineal Prostatectomy under Local Anæsthesia. *Journal of the American Medical Association*, February 11, 1905, p. 471.

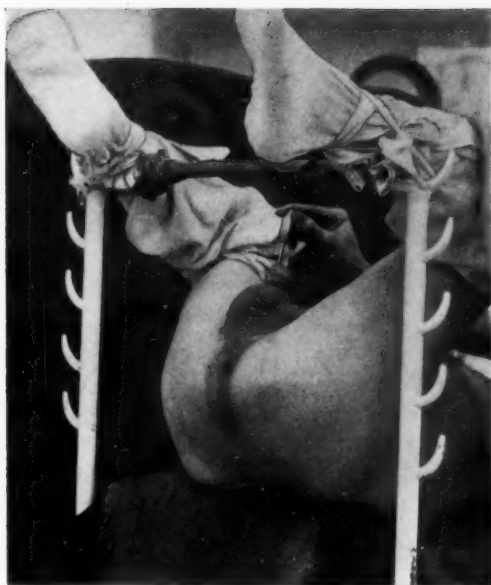


FIG. 2.—Perineal prostatectomy. Patient in position for operation ;
staff in urethra held by assistant.



FIG. 3.—Perineal prostatectomy The primary incision.



FIG. 4.—Perineal prostatectomy. Delimitation of the bulb. (Photograph taken after removal of prostate, and the bulb permitted to drop back into place.)



periprostatic space. By its prolongation anteriorly the membranous urethra is swung from the pubic arch and its main portion, inserted into the anterior wall of the rectum above the internal sphincter, draws that portion of the rectum forward towards the urethra; in many instances in the aged the bulb is so enlarged (Fig. 1) that its backward projection is sufficient to cover entirely the space between rectum and urethra. The delimitation of the bulb is quickly accomplished after the division of the ano-bulbar raphe (Fig. 4). The bulb is then drawn forward in the grasp of a forceps until the membranous urethra is identified, distended as it is by the sound that fills it, but obscured by the recto-urethralis muscle. As the bulb is drawn forward the posterior edge of the transverse perineal muscle, on each side, is made tense and identifiable, and is a guide to the location of the artery of the bulb which is to be avoided. Just behind these transverse perineal fibres and vessels to the outer side of the urethra is a weak spot in the deep perineal fascia through which the tip of the finger can readily be made to bore, and to penetrate alongside the membranous urethra even back to the prostate. The finger-tips thrust in at this point pressing outward and backward towards the ichia quickly opens up these lateral spaces, into which suitable retractors are at once placed.

d. The Exposure of the Prostate.—The detachment of the recto-urethral fibres from the face of the membranous urethra is now readily effected, guided by the eye and aided by snips of the scissors or touches of the knife, but for the most part bluntly done by the finger. The rectum, now freed from its anterior attachments, is pushed backward; the connective tissue about the urethra and the face of the prostate is readily detached and rolled back by the finger-tips until the rectoprostatic interspace is penetrated as deeply as the conditions may require. A broad, blunt-edged retractor is adjusted so as to keep the rectum drawn back from the field, and, with the assistance of the lateral retractors already placed, the prostate is fully exposed. The description of the operative steps thus far may have seemed long, but the work itself

advances steadily from point to point, and does not take much time for its accomplishment. (In the experience of the writer from ten to twelve minutes.)

e. The Downward Traction of the Prostate.—The prostate may be forced down towards the perineal surface by strong counterpressure from above the pubis, or it may be seized by suitable traction forceps introduced through the perineal wound and dragged down so as to be more accessible to attack; but greater advantages are possessed by forms of tractors which are introduced through the urethra into the bladder and by expansion or unfolding of intravesical blades furnish a mechanism whereby strong traction can be exercised upon the base of the bladder. Such are the tractors of Lydston, Syms, de Pezzer, and Young. Of these I have used with great satisfaction the model devised by Young. The time for its introduction is after the prostate has been fully exposed as described in the preceding paragraph. The membranous urethra is also fully exposed in the wound, distended by the sound, which now serves as a guide by which to incise the prostatic urethra, beginning at the apex of the gland and extending the incision as far backward as may be necessary to give room for the ready introduction of the rather blunt and clumsy beak of the tractor. After the incision has been made, the sound is withdrawn, the edges of the incision are held apart by tenacula or loops of thread that have been inserted into them, and the tractor passed through the prostatic urethra into the bladder. Its blades are then rotated so as to form two divergent wings within the bladder, by means of which later traction is made as required with a minimum of injury to the mucous membrane of the bladder. Such an instrument is more than a tractor; it is practically an elongated finger by means of which the operator can appreciate to a notable degree the conditions within the bladder, can make such graduated counterpressure as he may require to facilitate the progress of his enucleation, and can gauge the extent and progress of his work at any time. It contributes to a notable degree to the positiveness and accuracy of the work.



FIG. 5.—Perineal prostatectomy. The prostate exposed; the tractor introduced and used to pull down the prostate; the primary incision in the capsule made.

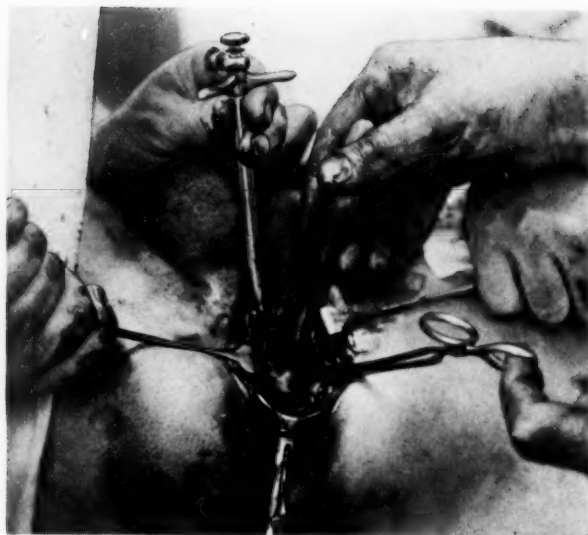
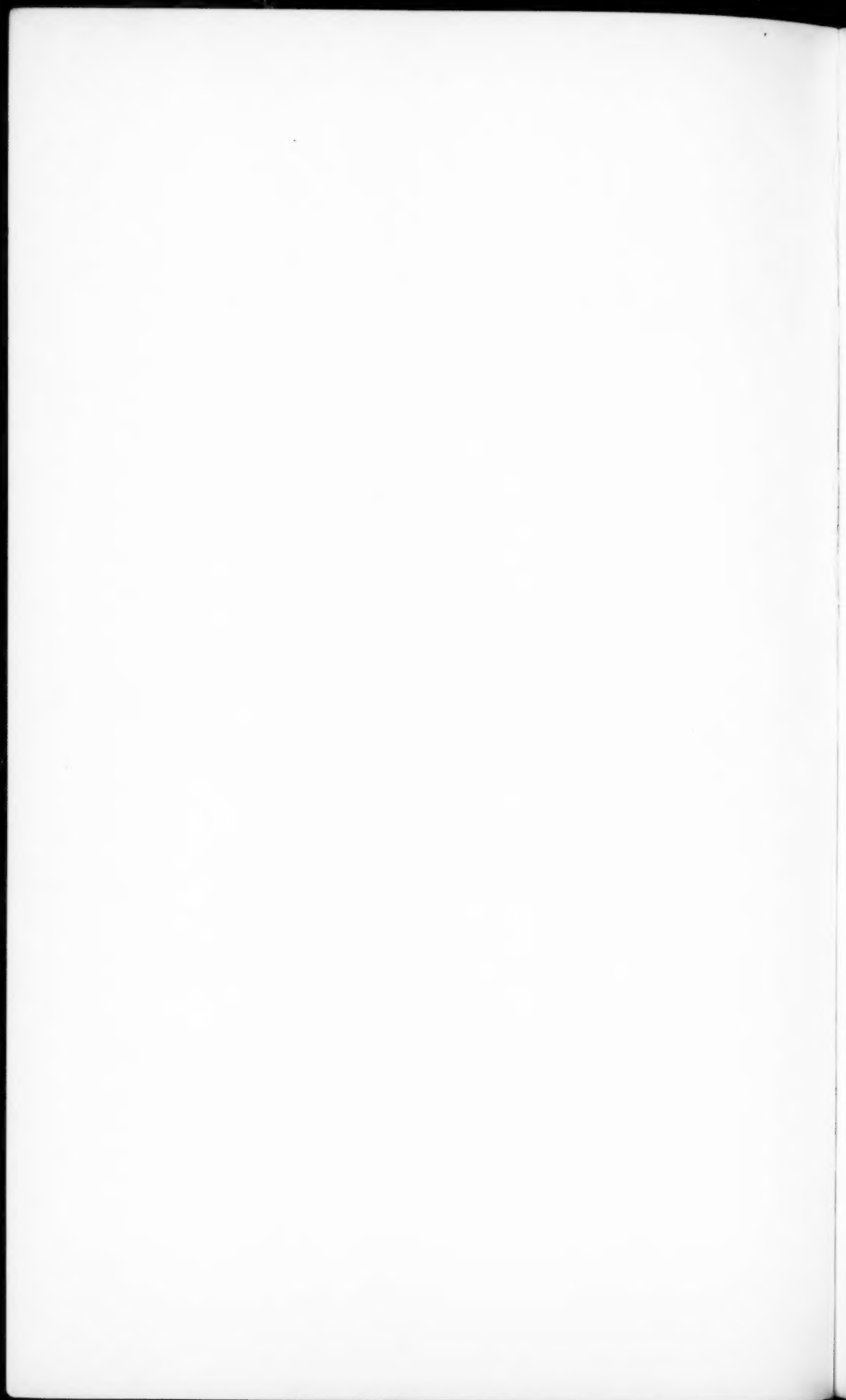


FIG. 6.—Perineal prostatectomy. Enucleation of hypertrophied mass by blunt dissector.



FIG. 7.—Perineal prostatectomy. Wound sutured; bladder drain-tube placed.



f. Enucleation of the Hypertrophied Masses.—To effect this, I have found the technique described by Young very satisfactory. The prostate having been brought into good exposure, two free longitudinal incisions are then made through the capsule to a depth of about one and a half centimetres into the substance of the gland (Fig. 5), one on either side of the urethra. These are about one and a half centimetres apart in front and diverge slightly as they pass backward. The bridge of tissue that lies between them supports the urethra and contains the ejaculatory ducts. The outer edge of one of the wounds in the capsule is then seized with tissue forceps to steady it, and a blunt dissector entered in the line of cleavage that presents; with this the mass in the lateral lobe is readily enucleated anteriorly and externally (Fig. 6); the partially turned-out mass can now be seized with a suitable traction forceps and pulled upon to facilitate the separation of the deeper portion. The finger-tip may now be substituted for the blunt dissector as the enucleation extends into a region beyond the control of the eye. As that portion of the mass is reached which lies adjacent to the urethra, it should be separated with especial care to avoid tearing the urethra; the blunt dissector, the touch of the knife point, or a snip of the scissors may be required to divide the bands of tissue that may unite it to the urethral wall. The other lateral mass is then removed in the same manner. The presence of a median lobe is then readily determined by the conjoined manipulation of the finger-tip in the lateral prostatic cavities and the tractor in the bladder, and if present may usually be brought down into reach of the enucleating finger with marked ease by the pressure of the suitably placed intra-vesical blades of the tractor, and is freed and turned out through one of these lateral spaces, without injury to the bladder and in many cases, it is believed, without injury to the ejaculatory ducts. If palpation reveals now the further presence of a mass of hypertrophy in the posterior median bridge yet left, it can be exposed by transverse incision and enucleated, but probably such removal would entail cutting

across the ejaculatory ducts. In the relatively small, hard, fibrotic prostates, the enucleation of great masses is not possible; some small glandular nodules may be present and readily turned out, but for the removal of the greater part of each lobe there is required a piecemeal excision by traction forceps and scissors.

The operator will be able to determine with great facility and accuracy the thickness of the tissue intervening between the depth of his dissection and the cavity of the bladder by the tip of his finger in the wound pressed against the broad blades of the tractor in the bladder. By the tractor also, used as a searcher, for which its shape well fits it, the question of the presence of calculi in the bladder will be determined. If a calculus is present, the prostatic urethra must be dilated sufficiently to permit of the introduction of the instruments required for its removal.

In cases of fibrotic contracture of the internal meatus, a free incision of the floor of the prostatic urethra through the ring at the internal meatus into the bladder should be made.

If a pedunculated median intravesical growth is found that cannot readily be everted into a lateral cavity, the prostatic urethra should be incised backward sufficiently to allow of the tumor being caught and brought out into the urethral wound and cut away.

g. The Primary Wound Dressing.—The tractor having been withdrawn, its blades having been first closed, the bladder should be well washed out to free it of any clots that may have formed in it. In most of my cases I have then introduced into the bladder a large-sized—No. 30—soft-rubber catheter throughout the urethra from the meatus externus and tied it in; this to remain for a week as a mould for the more surely obtaining the best reconstitution of the urethra. Around this I have brought the periurethral tissues by several points of chromic-gut suture. This catheter having been removed on the seventh day, a No. 26 sound was passed on the third day after its removal, and twice a week for the ensuing two weeks, after which further instrumentation was suspended. In cases

complicated by much cystitis, such irrigations and intravesical medication as the case demanded were readily given through this catheter á demeure. In addition, a tampon of iodoform gauze and a short tube drain of rubber were laid in the perineal wound to the deepest part of the wound cavity. These were removed on the fifth day, and the wound cavity well irrigated, and then left to contract. The lateral wound spaces were brought together by some points of deeply placed chromic suture, and the external wound closed over about one-half its extent by several points of silkworm-gut suture. The results following this method of after-treatment have been highly satisfactory. The perineal wounds have rapidly closed; no permanent fistulæ, other than the one case of recto-urethral fistula already noted, have remained; the ability of the bladder to retain and expel at due intervals its contents has early been regained, with the reservation as to some temporary defects in retention described in a preceding page, and no stricture of the urethra, that I am aware of, has developed. In my last three cases, Cases XXI, XXII, and XXIII, however, instead of the catheter á demeure, I have simply placed a large rubber drain tube through the opening in the prostatic urethra into the bladder and secured its outer end at one angle of the external perineal wound (Fig. 7) by a point of suture, at the same time laying an iodoform gauze tampon into the depth of the perineal wound. The tampon was removed on the fifth day, the bladder drain-tube on the seventh day, when, after an irrigation of the bladder and urethra, a sound was passed through meatus and urethra into bladder. The later history of these cases has been quite as favorable as those that preceded them, and, as the method is more simple and less irksome to the patient than the preceding one, I am inclined to regard it as to be preferred, unless further experience should show it to be attended with greater liability to the development of distortions or strictures of the urethra.

AFTER-TREATMENT.—*a. Local.*—The local cares are very simple, being those of any drained wound, plus the provisions for carrying away the urine. To the retained catheter of the

bladder perineal tube drain is attached a sufficient length of rubber tubing to reach a bottle hung at the side of the bed, which receives the urine conveyed through the tube. An absorbent compress to the perineal wound, retained by a T-bandage, completes the dressing. The removal of the gauze tampon on the fifth day, and of the drain or catheter on the seventh day, and the opening of the urethra by sound have already been discussed. Instrumentation applied to the urethra or the wound cavity should be avoided as far as possible, but such a minimum careful use of the sound as is required to assure the surgeon of the continuity and full patency of the urethral canal ought not to be omitted.

The treatment of the complicating cystitis will receive such attention as the condition of the particular patient may determine. In none of my own cases has there seemed to be any indication for continuous irrigation of the bladder after operation.

b. General.—The aged men who are subjected to perineal prostatectomy bear the operation, as a rule, surprisingly well, even though the manipulations seem to be somewhat prolonged. This I take it is due to the little loss of blood that attends the work, and to the elevated position of the pelvis and lower limbs which is maintained during its progress. In the feebler patients, however, a later depression has in some cases manifested itself after their return to bed. This, however, soon responds to the use of heat, hypodermoclysis, and adrenalin.

Renal insufficiency is the chief other contingency to be provided against in the immediate after-care. The best preventive of this has already been supplied in the preoperative copious libations of water. These should be continued after the operation, and in the case of the appearance of deficient amount of renal secretion should be supplemented by rectal enemata, hypodermoclysis, and in the event of its continuance, despite these means, by direct intravenous saline infusion to the extent of 1200 to 1600 cubic centimetres.

RESULTS.—Up to date (February 21, 1905), the writer has removed the prostate gland in twenty-three patients, the

first operation having been done in September, 1902. In this case a restricted median incision was made, and the enucleation was conducted by the sense of touch alone. The patient recovered, was relieved from his dysuria, and has led an active life since; but as a surgical operative procedure the method was so unsatisfactory to his sense of good work that in all subsequent cases he has preferred to make use of sufficiently free external incisions to give him an adequate view of the field of work and better control of its various steps. In one case, No. XIX of the series, the suprapubic transvesical method was resorted to. It was in a case of a greatly enfeebled patient, fifty-seven years of age, with a massive intravesical projection of the hypertrophied prostate, multiple calculi, and a high grade of cystitis. A total enucleation of the whole prostate (Fig. 1, p. 484) was quickly effected after the method of Fuller, and an uncomplicated recovery followed. The remaining twenty-one cases have been subjected to the method of perineal attack already described.

The ages of the patients were as follows:

Over 80 years, 1	Between 65 and 70, 6
Between 75 and 80, 2	Between 60 and 65, 2
Between 70 and 75, 8	Between 55 and 60, 4

MORTALITY.—Two patients died as the result of the operation,—one, aged seventy-two years, from pulmonary congestion within twenty-four hours after operation; one, aged fifty-seven years, at the end of seven days, from uræmia due to progressive renal insufficiency.

RELIEF OF OBSTRUCTION.—Complete* and permanent in all cases except in Case VI, a man, fifty-nine years of age, with an atonic bladder and a contracted fibrotic condition of the internal meatus associated with a moderately enlarged

* Further examination of these patients might require some qualification of this statement as to its absoluteness in some cases by revealing a mild degree of residual urine. Subjectively, however, from the standpoint of the patient's sensations, it is correct, for they feel that they now evacuate their bladders as well as ever.

dense fibrotic prostate. When operated, he had a residual urine of thirty-two ounces. Six months later he still had eight ounces of residual urine, and was using a catheter twice daily.

FISTULÆ.—A persistent recto-urethral fistula remained in Case XI. This has already been remarked upon (see p. 571). In Case VII, a man of seventy-eight years of age, who was an exceedingly intractable patient and would not permit any bladder drain to be retained in the wound, was finally discharged from hospital with perineal wound soundly healed and with normal urination per urethram. Six months later there developed a perineal abscess followed by a perineal urinary fistula, which was successfully operated upon by Dr. J. B. Roberts, of Philadelphia. In all other cases sound and complete wound healing has followed.

EPIDIDYMITIS.—A transient epididymitis occurred in the after-course of the case in six instances. In two cases this epididymal infection terminated in suppuration (see p. 570).

CONTINENCE OF URINE.—The control of the bladder sphincters so as to prevent the involuntary escape of urine has been regained in great measure within from ten to twenty days after operation. Some weakness of the sphincters, resulting in slight leakage, if the patient cannot at once respond to a sense of need to empty the bladder, has continued to manifest itself for some months in some cases, but has gradually given way to normal control in most of the cases. In at least two instances, however, this sphincter weakness has in some degree continued permanently, but has entailed an infirmity so greatly less than the pre-existing dysuria that the patients bear it cheerfully and gratefully.

CONCLUSION.—These results have given me the highest satisfaction. They have fully equalled the expectations which the representations of other surgeons as to their experience in the work had created, and have definitely settled in my mind the conviction that at last surgery had to offer to the unfortunate and aged "prostatic" a fairly safe and reasonably cer-

tain means of relief. In the light of present experience and after as full a consideration of the anatomical and pathological conditions involved as I have been able to make, I am inclined to the conclusion that, as a rule, for the removal of the hypertrophied prostate, the method of free curved transverse perineal incision, with full exposure of the gland in the wound of operation, is to be preferred.

**A STUDY OF VARIOUS FORMS OF PROSTATIC
HYPERTROPHY FROM POST-MORTEM SPECI-
MENS AND BY THE CYSTOSCOPE, WITH REF-
ERENCE TO OPERATION.**

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THE increasing amount of interest directed towards the prostate with reference to operative treatment, either by the galvanocautery instruments or by the partial or complete enucleation methods, through the perineum, over the pubes, or both routes combined, requires as much knowledge of the gland as possible for the purpose of choosing one or the other of these various operative methods.

Watson ("Treatment of the Hypertrophied Prostate," 1888) pointed out that it was possible to enucleate two-thirds of all hypertrophied prostates through the perineal route alone; the remaining third, because of an elongated prostatic urethra caused by intravesical growth or large median lobe hypertrophy, was best removed over the pubes or by the combined suprapubic and perineal route.

Since this time certain tractors—de Pezzer's, Syms's, Delbet's, Lydston's, Young's, and Packard's, by which the gland is rendered more accessible through the perineal incision,—have made a larger proportion of the cases suitable for perineal enucleation.

Despite the fact that a large proportion of the hypertrophied glands may be removed through the perineal incision, there are still strong advocates of the suprapubic route. Freyer (*Lancet*, 1904, clxvii, p. 197) demonstrates conclusively that the time-honored operation of Belfield and McGill still preserves its usefulness. Likewise does Alexander (*New York Medical Record*, 1894) give evidence that the combined opera-

tion is followed by good results. Freudenberg (*Deutsch. med. Zeit.*, 1900, Nos. 1 to 6) presents convincing evidence in favor of the Bottini operation; while White (*ANNALS OF SURGERY*, 1904, Vol. xl, p. 782) shows that castration still has a following. With so decisive a difference of opinion between foremost surgeons of the world in this branch of surgery, it is obvious that we have not as yet become convinced that there is a single operative procedure *par excellence*.

That this difference of opinion should exist may be grounded upon the operative skill of the different surgeons with regard to the special methods with which they are familiar. It may be true, also, that the successful cases operated by any of the various methods would do equally well by another method; or it may indicate that no one operative procedure is suitable for all cases.

The preference of the perineal route by Albarran, Proust, and other Frenchmen, supported by Gouley, Watson, Goodfellow, and others in America, while the English maintain a preference for the suprapubic route, resembles not a little the controversy over the high and the low cutting for stone in the early part of the eighteenth century.

If there is to be further progress in treating the malady, hypertrophied prostate, it seems to the writer that it will depend not only upon the publications of results by the different operative methods, but also by studies of the forms of the hypertrophies with a hope of determining which of the already perfected methods are to be chosen, and if no one appears suitable for the majority of cases, which should be chosen in any given case. It is with this in view that the following study and facts are presented.

Keyes ("Genito-Urinary Diseases," 1903, p. 253), in considering the cases recorded by Thompson, Prédal, Desnos, Motz, and Watson, concludes that eighty-four out of every 100 cases of prostatic hypertrophy may be diagnosed by rectal palpation. He does not, however, by this means attempt to distinguish the part or parts of the gland which cause the obstruction, which fact may be the important element to be

considered in choosing one or another method of operative treatment.

The relative frequency of the enlargement of the different portions of the prostate has been recalled by Thompson, Dittel, Watson, and others. The form of the growth varies, and the different varieties occur in the order of frequency, as follows: 1. An enlargement of the two lateral lobes, together with an enlargement of the so-called third, or middle, lobe. 2. Enlargement of the median lobe alone. 3. Enlargement of the lateral lobes alone. 4. Enlargement of the median and one lateral lobe. 5. Growths occurring in the form of independent, discrete tumor nodules, situated most frequently along the course of the prostatic urethra, and less commonly on the vesical surface of the gland. There may be hyperplasia of the prostatic tissue, so as to produce a combination of any of the above-mentioned conditions. They are, however, but combinations of the above conditions and hardly justify further classification.

The cystoscope is the only means by which the exact character of the obstruction may be learned, and while perhaps it is more commonly used to determine whether or not the given gland is suitable for the Bottini operation, it also serves as an important means by which the intravesical character of the gland may be studied, and thereby determine the nature of the obstruction and aid in determining which route should be employed in a more radical operation.

The interpretation of the size, shape, and contour of the gland, and the character of the vesical orifice, requires more experience for correct interpretation than probably any other given element in the field of cystoscopy. An exact knowledge of the topography of the prostate, for performing the Bottini or the more uncommon galvanocautery operations, is the fundamental step in the procedure, without an exact knowledge of which these operations are not only dangerous, but unjustifiable.

THE CYSTOSCOPIC INSTRUMENTS.

No mention will be made of the simple direct convex diagnostic cystoscopes or those employing air as the examining

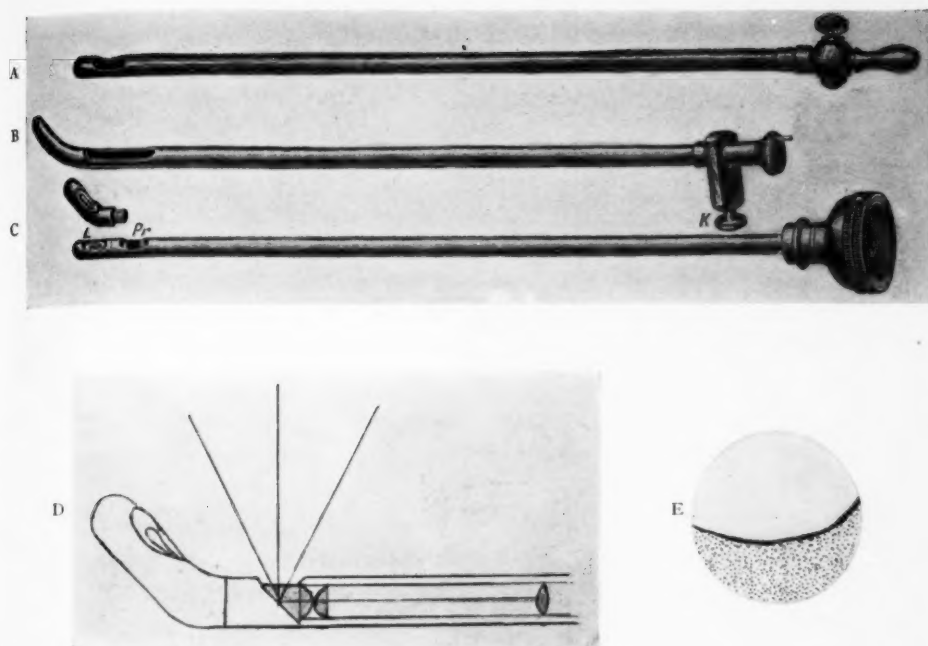


FIG. 1.—Kollmann's Simple Indirect Concave Diagnostic Cystoscope.

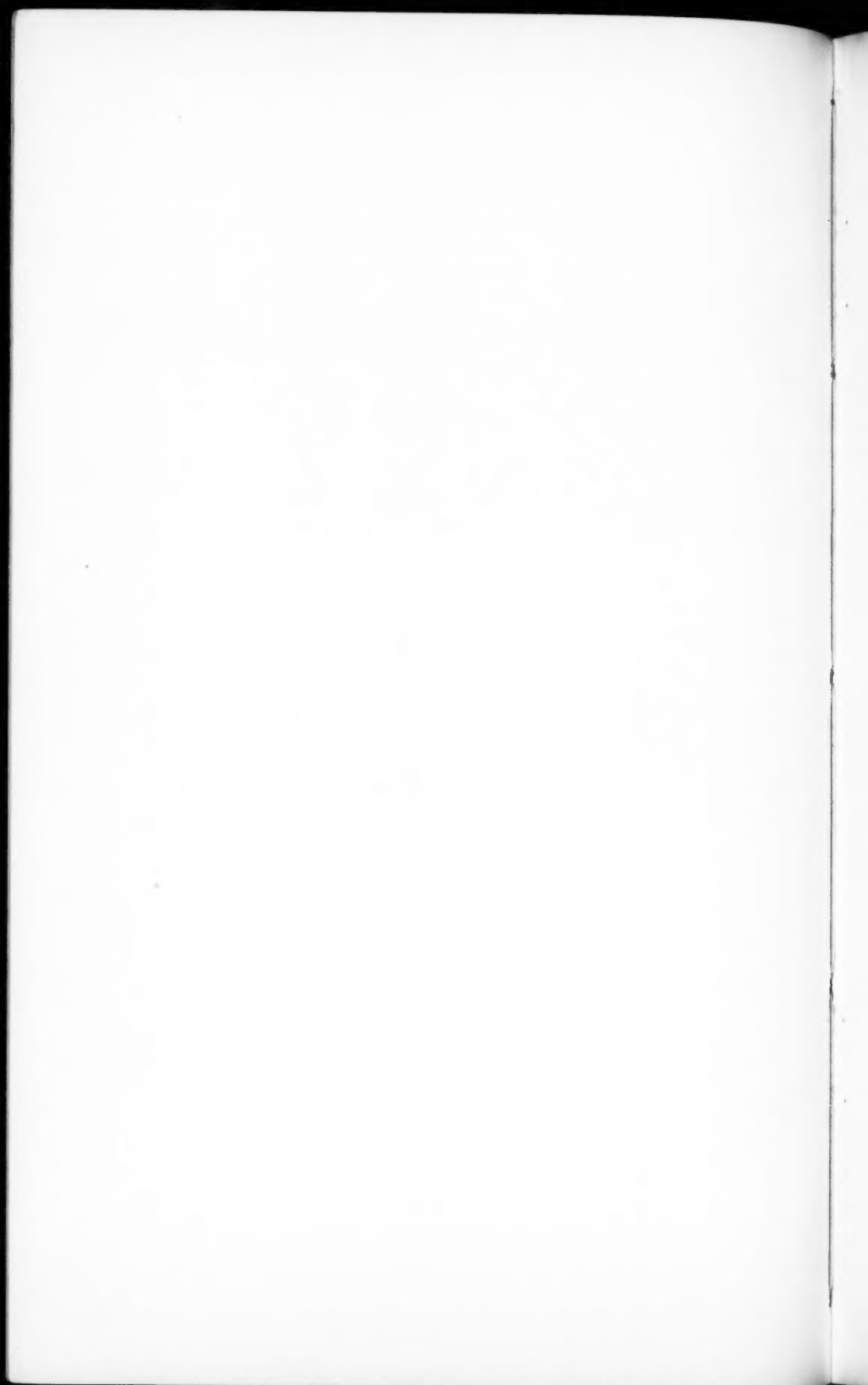
A. The irrigating tube introduced into the sheath, B, during the introduction of the sheath into the bladder and through which the bladder is irrigated.

B. Sheath which contains the irrigating tube, A, during introduction and which receives the cystoscope, C, with the straight lamp. The device, K, at the proximal end is a sliding-valve for the purpose of holding the examining medium in the bladder during the removal of the irrigating tube, A, and the insertion of the straight cystoscope, C.

C. Shows the cystoscope fitted with the straight lamp for use; within the above is a cane beak which is secured into the shaft, where the bladder urine is carried through a catheter.

D. Shows the optics of the simple cystoscope. The field of vision is at a right angle to the long axis of the instrument's shaft.

E. Shows a single cystoscopic field of a normal prostate.



medium, experience having proven them inferior to the simple indirect concave diagnostic instruments and the retrograde cystoscopes using water as the distending medium.

The principles and advantages of the cystoscopes best adapted for the diagnosis of prostatic hypertrophy will be briefly mentioned.

With the *Simple Concave or Indirect Diagnostic Cystoscope*, the field of vision is at right angles to the long axis of the instrument's shaft, the light being deflected ninety degrees by the large rectangular prism forming the window (Fig. 1). The posterior and lateral walls of the bladder are easily examined, but to view the anterior wall the ocular end of the cystoscope must be depressed as far as possible, and to bring the base and vesical outlet into view the instrument must be withdrawn until the prism is on the edge of the vesical orifice. By keeping the window of the cystoscope on this level, depressing and elevating the ocular end of the instrument, and at the same time rotating the beak, pushing it inward and drawing it outward, the whole of the prostate may be inspected.

No one of the simple concave indirect diagnostic cystoscopes is especially adapted for the study of the prostate. The simple cystoscope of the Nitze or Leiter pattern is perhaps, on the whole, less desirable than those possessing in addition an irrigating sheath, which may be used if the presence of blood or pus necessitates a rapid examination, or if there is difficulty in passing an instrument into the bladder.

An instrument of this sort is Kollmann's (Fig. 1). (*Cent. f. d. krankh. d. Harn. u. Sex. Org.*, Leipzig, 1900, xl, 393-402, and *Cent. f. Chir.*, Leipzig, 1900, xxvii, 1058-1060.) This instrument, antedated in principle by Gueterbock, and followed in principle by a Nitze instrument and a cystoscope by Lang, combines the simple cystoscope with the most satisfactory arrangement for removing and replacing the examining medium, and for irrigating the bladder in those cases in which it is especially foul or difficult to instrument.

The Retrograde Cystoscopes.—Nitze, in his cystoscopic production of 1887, considered it necessary to have three in-

struments for the purpose of rendering possible a complete visual examination of the bladder. These instruments are known as the Nitze cystoscope, No. 1, No. 2, and No. 3. The No. 1 has the lamp and prism on the concave surface, and has served as a model for the simple diagnostic cystoscopes of to-day. The No. 2 has the lamp and prism on the convex surface, and was for the purpose of examining the bladder fundus. This instrument does not concern us. Suffice it to say that it never had any practical value, the No. 1 instrument accomplishing the purpose for which the No. 2 cystoscope was intended.

Nitze's No. 3 cystoscope (Fig. 2) was intended by him to be a retrograde cystoscope, that is, to look directly backward towards the operator, bringing into view the base of the bladder and the vesical outlet. This instrument was the first of the retrograde cystoscopes, and fails, as a desirable instrument for examinations of the prostate and vesical outlet, because the visual arc falls short of the instrument's shaft, thereby giving no landmark for orientation.

Nitze, after the appearance of the retrograde cystoscopes of Young and Schlagintweit, produced another retrograde cystoscope involving the principle of the latter's instrument. By placing the beak at a nearer right angle with the shaft, the visual arc is made to include the edge of the instrument's shaft (Fig. 3).

Young, in 1900 (a date prior to the second Nitze and the Schlagintweit retrograde cystoscopes), designed, and had constructed by Hirschmann, a retrograde cystoscope, which, employing a double prism with two reflecting surfaces, enabled the operator to look directly backward onto the instrument's shaft (Fig. 4). (Meeting of the American Association of Genito-Urinary Surgeons, May, 1893.) Objection has been made to the hump on the convexity at the site of the lens, and the instrument has not found general favor.

The instrument which is unique in the class of retrograde cystoscopes is the *Schlagintweit instrument* (*Ann. d. Mal. d. Organ. Genito-Urin.*, Paris, 1803, xxi, 874-980). It is con-

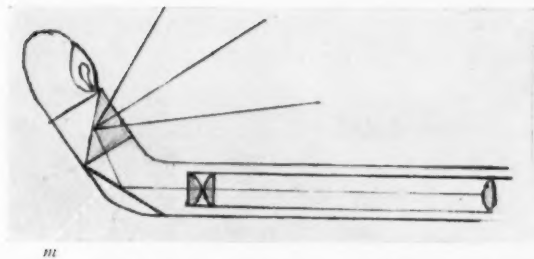


FIG. 2.—Nitze No. 3 Retrograde Cystoscope of the 1887 pattern.

Note that the beak is at an almost right angle with the shaft of the instrument. Note also that the field of vision does not include the instrument's shaft. The image after passing through the prism is deflected backward by a mirror (*m*).

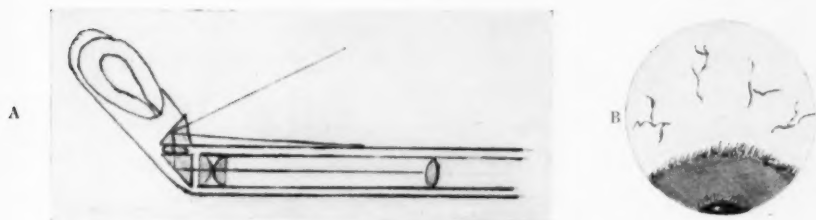


FIG. 3.—Nitze's new Retrograde Cystoscope.

A. Note that the field of vision includes the instrument's shaft. Note that to accomplish this two prisms are employed.

B. The cystoscopic field. Note the shaft of the instrument at the lower edge of the field; above the prostate, and above that the bladder wall.

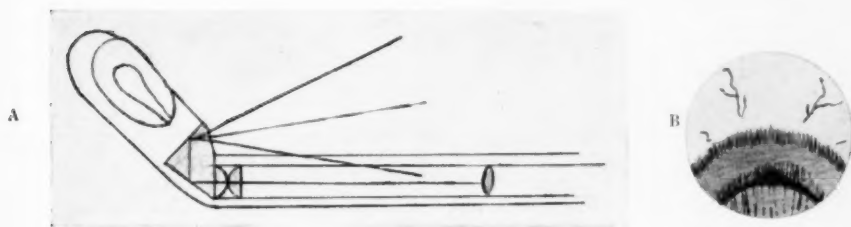


FIG. 4.—Young's Retrograde Cystoscope.

A. Note that the instrument's shaft is within the field of vision, and that this is accomplished by a single prism with two reflecting surfaces. Note the clumsy hump made by the prism.

B. A cystoscopic field. The shaft of the instrument seen at the lower edge; above prostate and bladder wall.

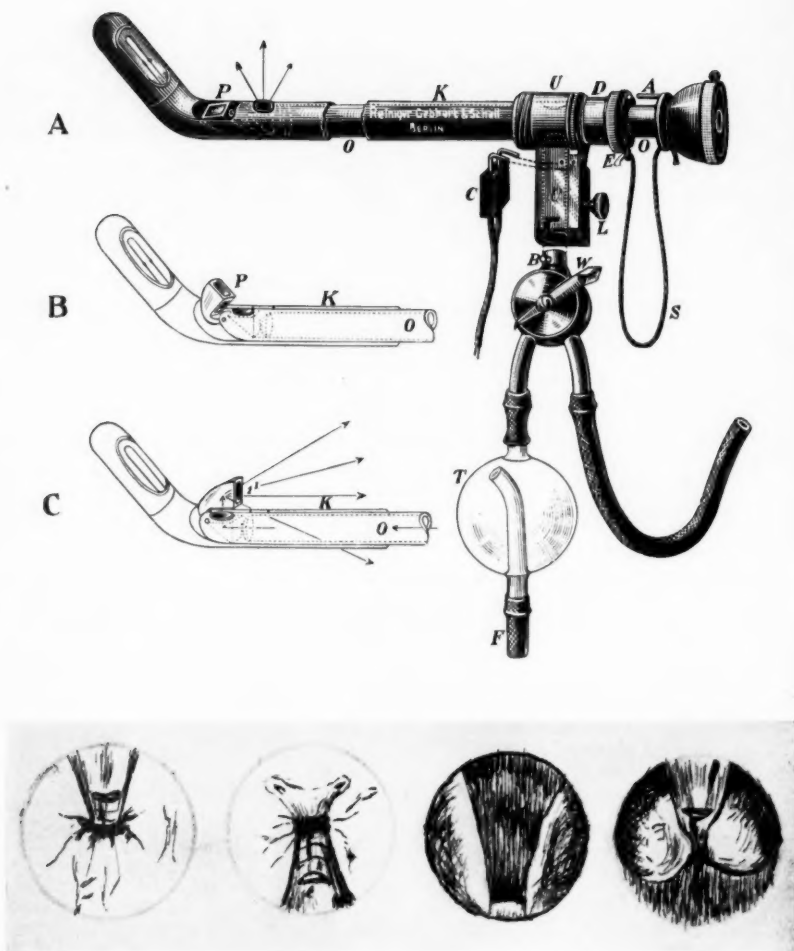


FIG. 5.—Schlagintweit's Retrograde Cystoscope.

A. Represents the instrument as a whole; the prism (*P*) being within the shaft makes the instrument essentially a simple, indirect diagnostic cystoscope.

B. Shows the prism (*P*) partially forced out of the shaft.

C. Shows the prism (*P*) in position to examine the vesical outlet and vesical surface of the prostate and bladder base.

D. In the first two figures the shaft of the instrument is visible, presenting through the bladder orifice; the prism being high within the bladder, the base of the viscus is evident. In the second two pictures the shaft is also visible, but the prism being nearer the vesical outlet the prostate occupies the field of vision.

structed upon a fundamental plan which is common to the new cystoscopes of Reiniger, Gibbert, and Schall for the ureter and electrolytic operations (Fig. 5).

Retrograde views with this instrument are rendered possible by a reflecting prism (*p*, Fig. 5, A), which is constructed upon a movable joint at the extremity of the optic tube (*o*), which tube glides into the interior of the outer tube (*k*). By pushing forward the tube (*o*), the prism (*p*) is thrown up forward, and assumes the position as in Figs. 5, B and C. The rays are transferred for a second time perpendicularly, so that one sees in the direction held by the shaft, that is, directly backward. By drawing back the optic tube (*o*), so that the prism is in the position as in Fig 5, A, the instrument may be used as any ordinary, simple, diagnostic cystoscope.

The section containing the bulb (*T*), with the neck-piece (*A*), is attached to the shoulder (*U*), and the optic tube being withdrawn to the exterior of the cord (*S*) allows the fluid from the bladder to run out into the bulb (*T*) when the valve is opened by the lever (*W*). Irrigation through the tube (*J*) from a reservoir is alternated with evacuation into the bulb (*T*) by turning the lever alternately one way or the other.

The optic tube being returned to a position for an ordinary or retrograde view, the attachment with the battery is made through the electrical plugs (*C*) by placing them in position as indicated in Fig. 5, A.

None of the retrograde cystoscopes can be commended as accomplishing all that might be desired. In order to bring all parts of the vesical orifices into view, these instruments must be made to assume from four to eight different positions, and in this they possess no advantage over the simple cystoscopes. The images received by the eye are inverted, and, as with the simple cystoscope, must be transposed by the examiner before the actual shape of the bladder outlet is pictured. Again, a large intravesical projection cannot be seen as a whole, and the interpretation of the fields necessary to cover it are more difficult to compile than are the images received when employing the simple cystoscope. The optics of the retrograde cystoscopes

being more complicated than those of the simple diagnostic instruments, render the object less distinct, much light being lost by the double reflection through the two large prisms.

It is necessary in every examination to employ a simple diagnostic cystoscope to study the bladder. Schlagintweit, appreciating this fact, and also the inconveniences of having both a retrograde and a simple cystoscope ready for each examination, has ingeniously embodied both principles in one instrument, as already noted. This combined instrument, however, when used as a simple diagnostic cystoscope, is less satisfactory than one of the regular simple cystoscopes because of its complicated optics, whereby much light is absorbed in the transmission of the object. The mechanics of the Schlagintweit instrument, although not unnecessarily complicated, still possess delicate features which get out of order easily. This is especially true of the sliding prism.

Suprapubic Cystoscopes.—There is a small class of cases in which it is impossible to make the simple cystoscope enter the bladder. Prostates which bleed sufficiently to continually smear the window of the cystoscope in its passage, and in which cases it is necessary to learn the contour of the gland in anticipation of a Bottini operation or otherwise, suprapubic cystotomy may be indicated.

Kennedy, in 1894 (*New York Medical Record*, 1902, lxi, p. 610), devised a suprapubic cystoscope which consisted of a large trocar made to fit a 21 F. Otis endoscope. The bladder was emptied through the trocar and washed clean. A lamp was attached to the endoscope tube and, while the bladder was empty, its surface was examined.

Kraske, in 1902 (*Cent. f. Chirurg.*, Leipzig, 1803, xxix, 153-155), describes examinations of the bladder through suprapubic fistulæ which sometimes exist after suprapubic operations. The information gained in this manner caused him to make a trocar cystoscope, which he used in the class of cases already spoken of.

Soon after the appearance of Dr. Kraske's article, Fenwick published (*British Medical Journal*, March 29, 1902, p.

772), referring to his work upon the subject ten years previously, and the suprapubic cystoscope which he devised for the purpose at that time ("Epitome of Urinary Surgery," 1894, p. 82). (Fig. 6.)

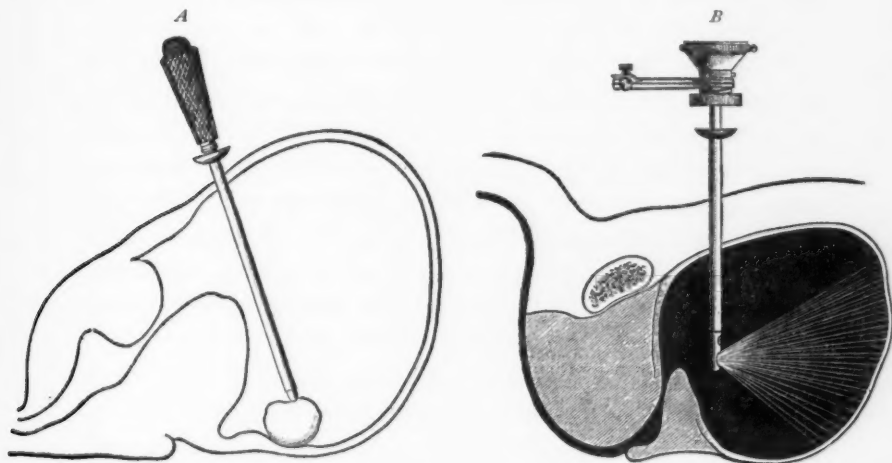


FIG. 6.—Fenwick's Suprapubic Trocar Cystoscope. *A* shows the trocar in position and the method of sounding the *bas fond* with a blunt pilot. *B* shows the cystoscope introduced through the trocar cannula.

In this class of cases where the enlargement of the prostate is so obstructive or vascular, and where symptoms lead one to believe that a stone may be situated in a deep *bas fond*, suprapubic sounding and cystoscopy through a cannula, as advised by Fenwick, are indicated with local anæsthesia. The trocar and cannula are made to enter the distended bladder through the space of Ritzius. The trocar, being removed from the cannula, is replaced by a loosely fitting, blunt instrument, by means of which the *bas fond* may be sounded for stone.

The cystoscope can be introduced, through the cannula, into the bladder, which may be examined after having been cleaned and distended with clear water. In such cases in which suprapubic sounding and cystoscopy revealing stone, new growths, or prostatic conditions requiring suprapubic cystotomy, the trocar may serve as a director in performing the operation.

The information gained by suprapubic sounding and cystoscopy averts the more serious procedure of suprapubic cystotomy as an exploratory measure, and, considering that the indications for such procedures are in the aged, in the majority of cases, the importance of suprapubic cystoscopy is obvious.

The interpretation of the picture which is revealed by suprapubic cystoscopy will at first be difficult to those familiar with the examination through the urethra. Although one may search directly for such landmarks as the bladder outlet, the trigone, and the ureteral orifices, their appearance from a different point of view is not always easy to recognize.

THE STEPS IN THE EXAMINATION AND THE POINTS TO BE DETERMINED BY THE EXAMINATION.

The prostatic urethra is a pliable tube which may be altered in its length, size, and shape. Such changes are demonstrable by three distinct steps in the examination: (1) The passage of the cystoscope into the bladder; (2) observing the appearance of the bladder outlet, and (3) by bimanual examination with the cystoscope, or the writer's special instrument, in the bladder and the finger in the rectum.

The study of the prostate by the cystoscope should in each case be directed towards learning the various points, as follows: 1. The obstructing portion of the gland. (Nodulous growths projecting into the prostatic urethra; compression of the prostatic urethra by one or both lateral lobes; by a middle lobe; or by any combination of these together.) 2. The condition of the remaining portion of the bladder and the ureteral orifices. 3. The comparative size of the various lobes, especially those producing the obstruction. 4. The length of the prostatic urethra.

These points are best gained by the simple, concave, indirect diagnostic cystoscope with a Mercier beak, although it may be of occasional interest to use one of the retrograde instruments, especially Schlagintweit's, to study the topography of the vesical surface of the gland. It is less frequently of

advantage to use one of the irrigating cystoscopes because of foul cystitis. In such instances an instrument of the Kollmann type is to be preferred to the ordinary irrigating cystoscopes, the irrigating tubes of which are too small to be of service in removing the foul material. When the cystoscope cannot be made to enter the bladder, or when bleeding occurs from such attempts, it becomes necessary, in certain cases, to resort to suprapubic cystoscopy, as practised by Fenwick, Kraske, and Kennedy.

Taking a case of the largest class, that is, one in which the bladder may be entered and irrigated through a small rubber catheter or coudé, and in which the simple, concave, indirect cystoscope is used to the greatest advantage, we may proceed with the examination, attempting to gain information upon the various points already enumerated.

The technique and results remain essentially the same with the retrograde or the irrigating cystoscopes of either type, but in suprapubic cystoscopy only such information is obtained regarding the obstruction as may be shown by intravesical conditions of the prostatic surface and distortions of the bladder outlet.

1. *To Learn the Site of the Obstructing Portion of the Gland.*—This is accomplished by the three steps in the examination, as follows: (1) The passage of the cystoscope into the bladder; (2) observing the appearance of the bladder outlet; (3) bimanual examination with the cystoscope in the bladder and the finger in the rectum.

In using either the simple diagnostic, the retrograde, or the irrigating cystoscope of either type fitted with a short Mercier's beak, the instrument is passed to the tip of the prostate. The ocular end is then gently depressed as far as possible before the beak will enter the prostatic urethra. In cases which have been leading a catheter life, the beak of the instrument will frequently be caught in a urethral pouch behind, or, less frequently, in front of the apex of the prostate, which projects into the urethra, not unlike the cervix into the vagina. When this condition is encountered, the succeeding attempts to

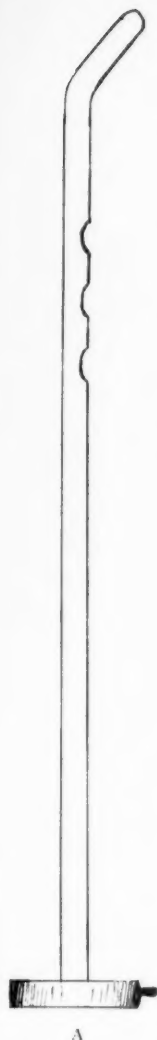
enter the bladder should be systematically as follows: withdraw the cystoscope for an inch or two and, depressing the ocular end, make the beak travel on the roof of the urethra. In the majority of cases this will insure a successful result. If, however, it fails, withdraw the instrument again and proceed with the beak on the floor. This failing, another attempt is made, using care to make the tip of the beak strike a point midway between the two previous ones. This failing, the attempts are repeated with great gentleness, carrying the instrument slightly to the right and left, and varying the degree of depression of the ocular end. The finger in the rectum will often facilitate these movements.

The beak having entered the prostatic urethra, the operator holds the instrument by the ocular end, lightly between the thumb and forefinger, and, watching the indicating knob, gently forces the cystoscope through the prostatic urethra, noting any deviation of the beak to the right or left, or any increased resistance, unevenness, or jerks in the course of its passage into the bladder.

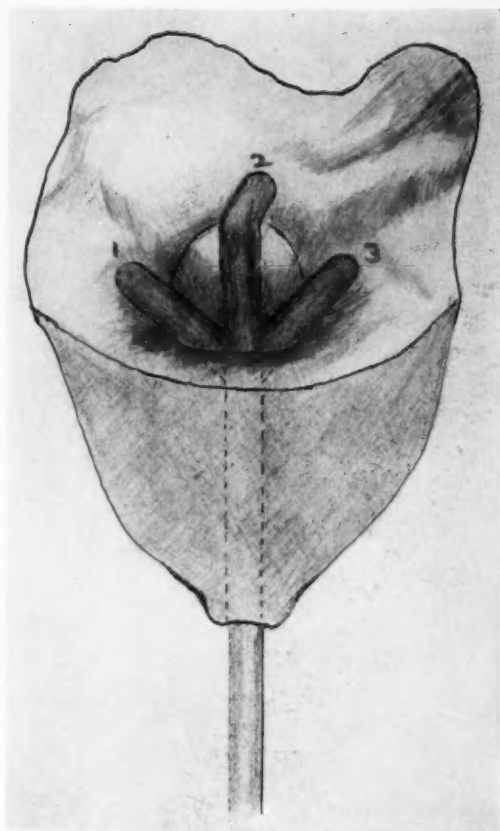
Careful observations of these points should give the first suspicions as to the probable condition to be found by inspection. The beak being turned to the right suggests encroachment upon the urethra from the left side, while temporary rotation and increased resistance over a small area during its passage through the prostatic urethra makes the presence of an obstructing nodule most probable. Any such physical signs are confirmed by the visual inspection, and in withdrawing the instrument with the finger in the rectum at the end of the bimanual examination.

The cystoscope being in the bladder, the topography of the vesical surface of the gland is to be studied, and such hypertrophies or distortions of the vesical orifice as are present noted.

Each picture of a single cystoscopic field is but a single inverted segment, which, with the others, will go to make up the composite picture. The result will be more or less accurate according to the examiner's ability to interpret and compile



A



B

FIG. 7.—A. The writer's special instrument for determining the length of the prostatic urethra. It consists of a two centimetre Mercier beak, a shaft of twenty French which has three depressions: one, three centimetres from the point of union of the beak with the shaft; another, five centimetres, and another seven centimetres, each depression and interval between being one centimetre in length.

B. The method of determining the height and breadth of the intravesical projection of the median lobe. The drawing is from the specimen seen in Plate IV. The instrument is seen in three positions. Position 1.—The beak is in the urethral cleft at the right of the median lobe. By keeping the beak on the surface of the gland and rotating the instrument, the shaft will be drawn inward as the beak surmounts the intravesical elevation and assumes the position 2. The distance which it is drawn in is determined by counting of the grooves in the instrument's shaft. Further rotation will cause the beak to assume position 3. The distance from position 1 to position 3 is the width of the lobe, and can be more or less accurately estimated by noting the arc through which the beak passes in going from position 1 to position 3.



the inverted views received in the various fields necessary to cover the whole vesical surface of the gland.

While a small sessile or pedunculated middle lobe may appear as a distinct tumor projecting into the bladder, it is unusual that the larger forms of this type of hypertrophy are so easily determined; and even after demonstrating such a lobe, it is unjust to consider it the cause of the obstruction unless other evidence is at hand. Likewise the intravesical projection of the lateral lobes, as determined by the shadow cast by them upon the lighter colored bladder wall, is no certainty of their urethral obstruction.

While the peripheral border of the prostate should be traversed, and the degree of the intravesical projection of the various areas noted by the degree and depth of the shadows cast by them, and their relative position with the intraureteral bar and ureteral orifices, the all-important feature to be determined by the examination is the shape of the vesical outlet. In this is found the evidence pointing to one or more lobes, which, by compressing the prostatic urethra, impedes the flow of urine through it. Therefore, in determining the site of the obstruction, it is necessary to learn the shape of the vesical orifice, which becomes distorted according to the lobe or lobes encroaching upon it.

Bimanual Examination.—With a cystoscopic beak of known size, or the writer's special instrument, in the bladder and the finger in the rectum, the tissue posterior to the vesical orifice, the breadth of the lateral lobes, and the length of the prostatic urethra may be approximately estimated. The intravesical elevations may be learned by drawing the beak of the cystoscope snugly to the vesical orifice and rotating it. Such elevations are noted by the cystoscope being drawn inward as it ascends, and again outward as it descends the elevation during the rotation of the cystoscope over the prostatic surface (Fig. 7). Such areas are located and their breadth determined by observing the position of the indicating knob and the arc through which the beak travels from the time of its rise to its descent. These distinctive features, gained only

by bimanual examination, show the importance of practising this method of examination in connection with cystoscopy for the purpose of gaining information regarding the growth.

Bimanual examination serves chiefly to determine the approximate size of the parts of the gland; but it also confirms and gives more complete knowledge of the sites of the obstructing portions.

The Normal Prostate (Plate I).—The normal vesical orifice when distended is an almost circular, dimple-like depression about one centimetre at its greatest width, without furrows or markings demonstrable by the cystoscope (Plate I, A).

(1) *The Passage of the Cystoscope into the Bladder.*—An anterior urethra without constrictions admits of a free passage of the cystoscope to the anterior layer of the triangular ligament, where the instrument is arrested until the ocular end is depressed, which act causes the cystoscope beak to enter the prostatic urethra. As the instrument is gently pushed onward through the prostatic urethra, no increased resistance is felt, nor is the beak deviated to one side or the other.

(2) *Observing the Appearance of the Bladder Outlet.*—The light being turned on, the cystoscope is drawn outward until the vesical orifice comes into view. The prism is now on a level with the edge of the vesical outlet, and if drawn outward a little farther, so as to bury it in the urethra, no image will be received. The prism being on the proper level, the beak is made to point posteriorly, and by rotating the instrument the beak is made to traverse the circumference of the bladder orifice, and a series of inverted images in a direction at right angles to the instrument's shaft are seen (Plate I, C). This series of inverted images is recorded (Plate I, D). Plate I, E, represents the actual shape of the vesical orifice determined by transposing the inverted cystoscopic pictures of which (C) is an example.

(3) *Bimanual Examination, the Cystoscope in the Bladder, and the Finger in the Rectum.*—The electrical connections of the cystoscope being detached, the beak of the instrument is made to point posteriorly, and is drawn snug against the

PLATE II.

DOUBLE LATERAL LOBE ENLARGEMENT.

A. Photographed specimen. B. Mesial section of the prostate and cross-section of the urethra. C. The cystoscopic picture of the posterior cleft. D. Diagram of the different cystoscopic fields. E. The actual shape of the vesical orifice and urethra.

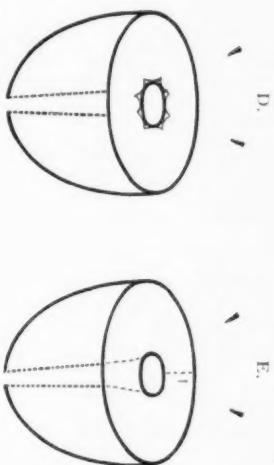
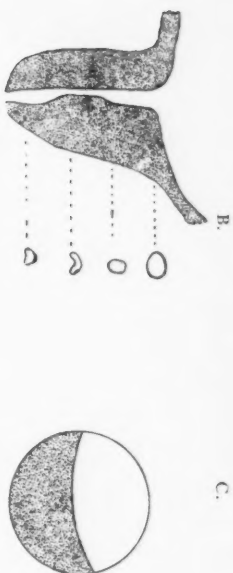
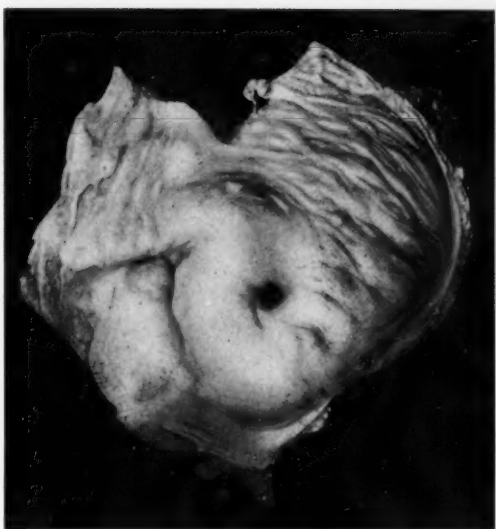


A. Hypertrophy of both lateral lobes of the prostate, with only a slight degree of intravesical projection and lengthening of the prostatic urethra. The urethra is dilated anteroposteriorly.
 B. Mesial section of the double lateral lobe enlargement (specimen A), showing the anteroposterior dilatation of the prostatic urethra, with only a slight degree of intravesical projection.
 C. The cystoscopic picture of the cleft formed posteriorly by the enlargement and intravesical projection of the lateral lobes. A similar cleft is seen anteriorly.
 D. The diagrammatic record of the different cystoscopic fields of the vesical orifice, showing a cleft posterior, *a*, and anterior, *b*, with the remaining fields normal in shape, but slightly deepened by the increased size of the lobes.
 E. The actual shape of the vesical orifice determined by transposing the inverted cystoscopic pictures recorded in D, with the accompanying narrowing and lengthening of the prostatic urethra; the tissue posterior to the vesical outlet is diminished in thickness.

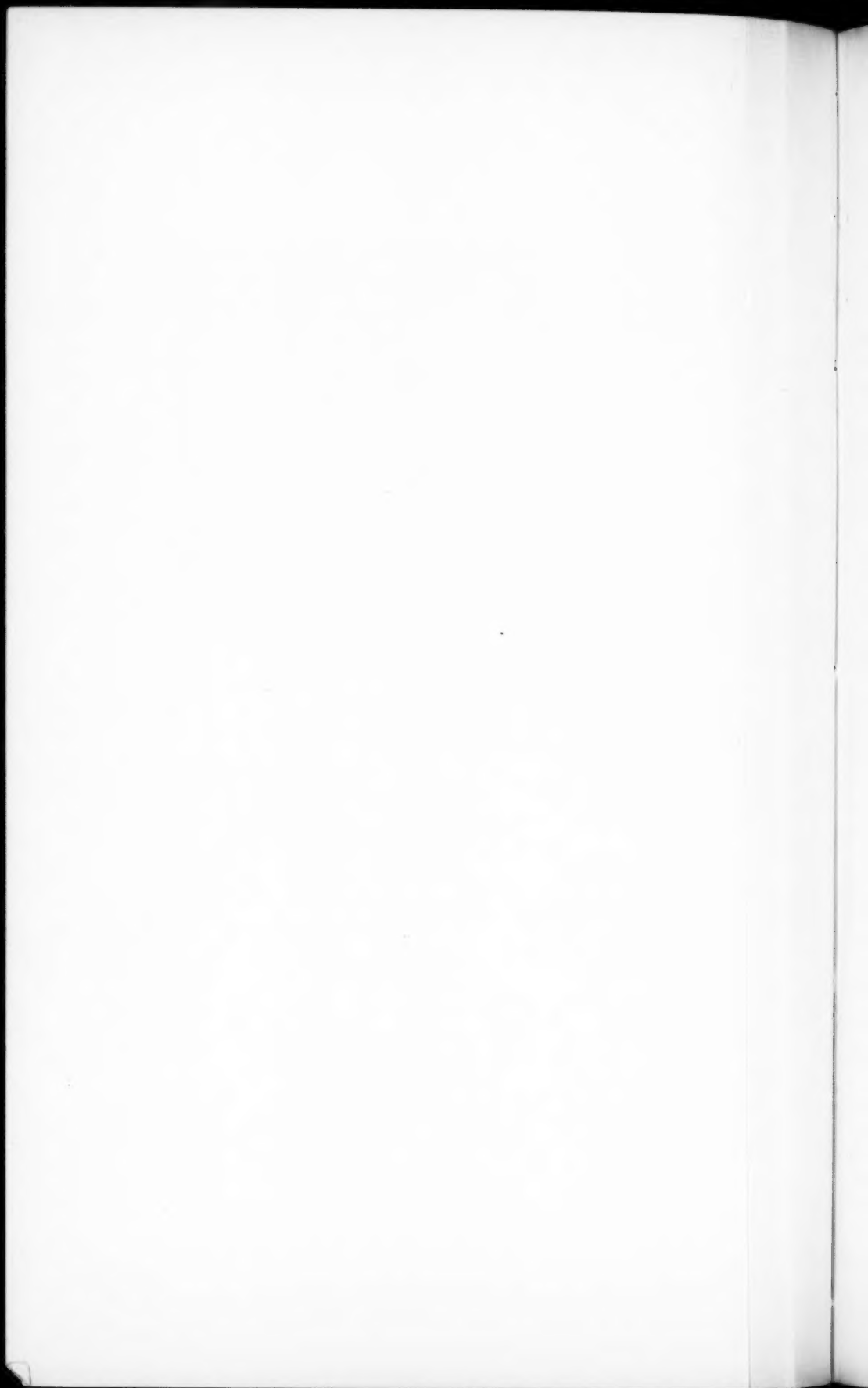
PLATE I.

NORMAL PROSTATE.

A. Photographed specimen. B. Mesial section of the prostate and cross-section of the urethra. C. A normal cystoscopic field. D. A diagram of the different cystoscopic fields. E. The actual shape of the vesical orifice and urethra.



A. Normal prostate. Note the dimple-like depression and circular shape of the vesical orifice.
 B. Mesial section of the normal prostate (specimen A), showing the projection of the verumontanum into the urethra and the shape of the normal urethra at different levels.
 C. The cystoscopic picture of any portion of the normal vesical orifice.
 D. The diagrammatic record of the different cystoscopic fields necessary to cover the circumference of the vesical orifice. (A series of cystoscopic pictures as C, a single segment)
 E. The actual shape of the vesical orifice determined by transposing the inverted cystoscopic pictures recorded in D.



vesical surface of the prostate. The rectal finger will determine a straight median raphe between the two lateral lobes, and is carried in turn laterally over the smooth, equal sized, non-tender lateral lobes which are of normal consistency. The finger is now carried to the posterior superior edge of the prostate, where the cystoscope beak of known size is found, and the thickness of the tissue from the posterior edge of the vesical orifice to the posterior edge of the gland is approximately estimated and recorded, as in Plate I, E. With the finger in the median raphe the instrument is withdrawn, and, as the beak passes through the prostatic urethra, the rectal finger follows it, and an approximate estimate is made of the thickness of the tissue posteriorly through the length of the prostatic urethra. No increased resistance, jumps, or deviation of the beak will be noted. If it is desirable to determine the length of the prostatic urethra, the writer's special instrument, previously mentioned, should now be used.

Double Lateral Lobe Enlargement (Plate II).—When the lateral lobes cause the obstruction, the urethra is narrowed laterally and is lengthened anteroposteriorly. The course of the prostatic urethra is at the same time deviated to one side or the other, if the lateral hypertrophy of one lobe is greater than that of the other, so, instead of a straight urethra dilated anteroposteriorly, its course is also curved. There is an associated degree of intravesical projection of the lobes, and the prostatic urethra is lengthened. Distinct clefts are formed at the anterior and posterior ends of the slit-like urethra. The posterior one of which is seen in Plate II, C.

(1) *The Passage of the Cystoscope into the Bladder.*—There may be difficulty in entering the beak into the prostatic urethra. As it is pushed on, the beak may be deviated to one side or the other, according to the greater or less hypertrophy of one or the other lobes, but when the hypertrophy is equal, as in the case illustrated, there will be no deviation of the beak. If, as is sometimes the case, the anteroposterior dilatation of the upper portion of the urethra is so great as to allow some degree of rotation of the instrument's beak within it,

one may receive the false impression that the bladder has been entered. The inability to see anything after the light has been turned on may be the first cue to the true situation. The suspicion of this condition having been aroused, the ocular end of the instrument is depressed and gently pushed onward, causing the beak to traverse the anterior wall of the urethra into the bladder.

(2) *Observing the Appearance of the Bladder Outlet.*—

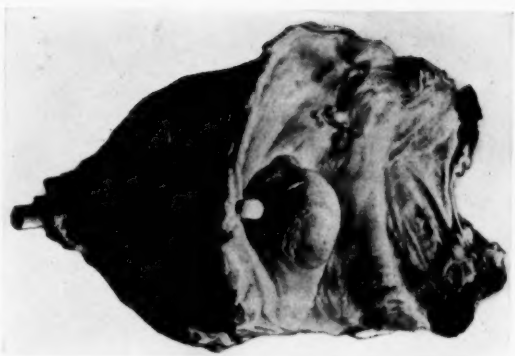
The cystoscope being in the bladder, the vesical surface of the prostate is viewed. In the fields *a* and *b* of Plate I, D, the cystoscopic pictures as in Plate II, C, will be seen. The cleft at the posterior edge of the urethra will be the deeper. All such clefts enlarge and decrease in size as they are forced open or allowed to close by drawing the cystoscope outward or pushing it inward. This, together with the depth and relative position of the shadow cast upon the lighter colored bladder surface, gives some visual information regarding the degree of intravesical projection of the hypertrophied lobes, but should be corroborated by the more exact method of bimanual examination. The remaining cystoscopic fields are normal.

(3) *Bimanual Examination with the Cystoscope in the Bladder and the Finger in the Rectum.*—The cystoscope, or the writer's special instrument, is placed so that the beak points posterior and is drawn snug against the vesical surface. The rectal finger will find the median raphe pronounced, the convexity of the lateral lobes increased in size, less sensitive, and harder than normal; the tissue posterior to the vesical surface lessened or little increased over normal. The length of the prostatic urethra will be found increased. Keeping the beak of the instrument snug against the vesical surface of the prostate, it is made to rotate over each lateral lobe in turn. By noting the distance which the instrument is drawn inward as it passes over the intravesical projections of the lobes, and the arc through which the beak rotates in covering the elevated areas, some idea of the size of the intravesical projection is attained (Fig. 7). In withdrawing the instrument, the rectal finger,

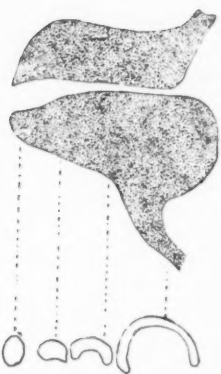
PLATE IV.

MEDIAN LOBE ENLARGEMENT ALONE.

A. Photographed specimen. B. Mesial section of prostate and urethra. C. Cystoscopic picture of the left cleft. D. Diagram of the different cystoscopic fields. E. The actual shape of the vesical orifice and urethra.



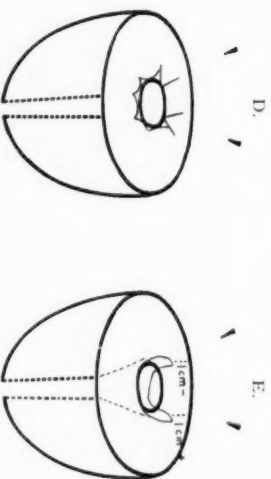
A.



B.



C.



D.

E.

A. Photograph of median lobe hypertrophy alone, showing the pedunculated intravesical growth and the semilunar shape of the vesical outlet. A rod is seen in the prostatic urethra, which is unopened. The laterally dilated urethra is seen to either side of the rod's tip.

B. Mesial section of the prostate and cross-section of the prostatic urethra at different levels. The mesial section shows the increased amount of prostatic tissue posteriorly and the intravesical growth forming a *bas fond*. Also the narrowing of the anteroposterior diameter of the urethra, the cross-section of which shows its lateral semilunar-shaped dilatation.

C. The cystoscopic picture of the cleft at the right of the pedunculation. A similar cleft is seen to the left side of the enlargement. D. A diagrammatic record of the cystoscopic fields of the vesical outlet, showing a cleft a short distance to either side of the posterior median point, which area is occupied by the intravesical hypertrophy.

E. The actual shape of the vesical orifice determined by transposing the inverted cystoscopic pictures recorded in D, showing the lateral semilunar-shaped dilatation of the vesical outlet, due to the pressing forward of the posterior hypertrophy. The amount of prostatic tissue posterior to the clefts of the vesical outlet is lessened.

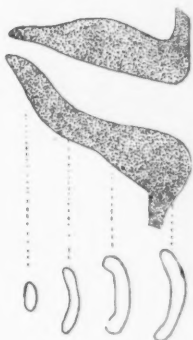
PLATE III.

ONE LATERAL LOBE ENLARGEMENT.

A. Photographed specimen. B. Mesial section of the prostate and urethra. C. Cystoscopic picture of the left posterior cleft. D. Diagram of the different cystoscopic fields. E. The usual shape of the vesical orifice and urethra.



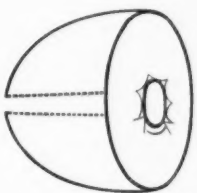
A.



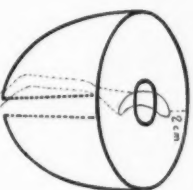
B.



C.



D.



E.

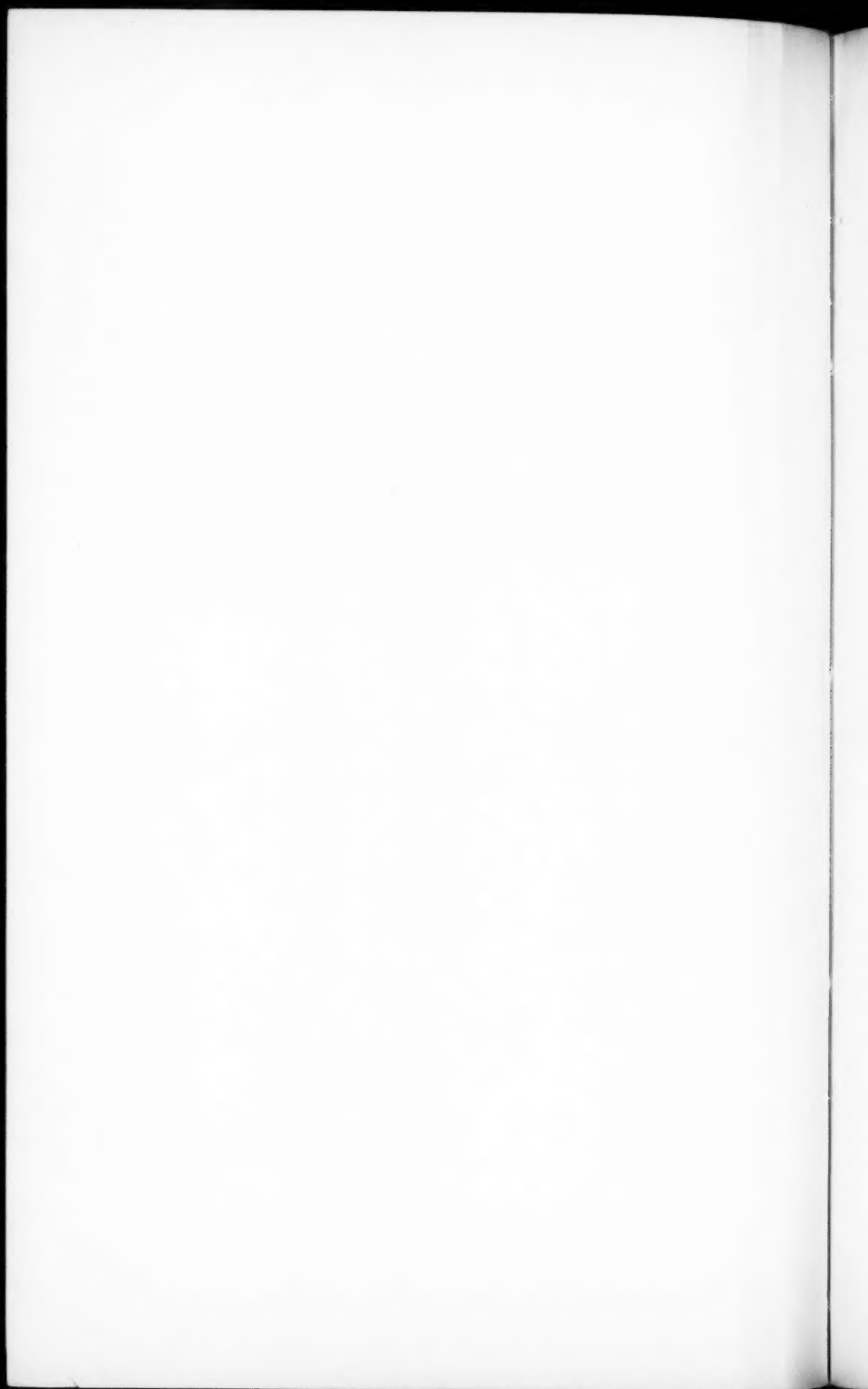
A. Hypertrophy of one lateral lobe, deviating the course of the urethra to one side and dilating it anteroposteriorly, so that the cross-sections are semilunar in shape. The course of the urethra is marked by a straw. A is a large interurethral bar, and may sometimes be erroneously considered by the cystoscope as a median lobe.

B. Mesial section of the single lateral lobe enlargement with the prostatic urethra brought into a straight line, showing the anteroposterior dilatation. The cross-sections of the urethra show its semilunar shape, due to the unequal pressure upon the prostatic urethra from hypertrophy of only one lateral lobe.

C. The cystoscopic picture of the posterior cleft on the left side, showing greater intravesical elevation of the left lobe, which is the one producing the deviation of the urethra. A similar cleft is seen anteriorly also on the left of the median line.

D. The diagrammatic record of the different cystoscopic fields of the vesical orifice, showing a cleft posterior and anterior slightly to the left of a median line.

E. The actual shape of the vesical orifice determined by transposing the inverted cystoscopic picture recorded in D, showing the lateral narrowing, lengthening, and deviation of the prostatic urethra. The prostatic tissue posterior to the vesical outlet is a little increased.



following the instrument's beak, shows the tissue posterior to the urethra to be little, if any, increased, and usually lessened.

One Lateral Lobe Enlargement (Plate III).—When one lateral lobe is hypertrophied, it encroaches upon the urethra, distorting the vesical orifice, so that it assumes the shape of a semilunar slit, a cleft being formed at its anterior and posterior ends. The course of the urethra is deviated to one side (Plate III).

(1) *Passage of Cystoscope into the Bladder.*—The cystoscope beak will probably enter the prostatic urethra pointing in a direction opposite to the lateral lobe hypertrophied. During its passage into the bladder, the beak will deviate to the side opposite the hypertrophied lobe. Pressure of the lobe upon the cystoscope, which by its passage into the bladder converts the deviated urethra into a straight line, may be considerable and should be noted.

(2) *Observing the Appearance of the Bladder Outlet.*—The cystoscopic fields of the vesical outlet will show a cleft anteriorly and posteriorly, both on the same side as the hypertrophied lobe, and which clefts mark the ends of the semilunar shaped urethra (Plate III, B, D, E). The remaining fields are normal, except the one between the clefts, over the convexity of the encroaching lobe, which is convex outward.

(3) *Bimanual Examination with the Cystoscope in the Bladder and the Finger in the Rectum.*—The cystoscope beak pointing posteriorly and drawn against the vesical surface of the gland will probably slip into the posterior cleft. The rectal finger will find the median raphe ill defined because of the pronounced convexity of the hypertrophied lateral lobe. Differences in consistency and sensitiveness between the two lobes may or may not be evident. Rotation of the cystoscope, or the writer's special instrument, over the lobe will give an approximate estimate of the height and width of the intravesical elevation of the hypertrophied lobe. In withdrawing the instrument, the beak will be deviated in the same direction as during its introduction, that is, away from the hypertrophied

lobe, and the amount of tissue posterior to the urethra is usually increased.

Median Lobe Enlargement (Plate IV).—This form of hypertrophy, which, according to Albarran and Motz (*Ann. d. Mal. d. Organ. Genito-Urin.*, July, 1902), takes place from glandular tissue situated between the lateral lobes in the upper part of the prostatic urethra and called "the prespermatic group of glands," and those glands beneath the mucous membrane which Jones (*Virchow's Archiv*, 1894, cxxix, 224) has demonstrated as the beginning of such growths, encroach upon the urethra as well as growing upward into the bladder.

The growth into the urethra converts it into a U, the centre of which is occupied by the hypertrophied tissue, and on either side of which the urine is passed. These slits are seen by the cystoscope as clefts of varying size and depth according to the degree of the growth, and are located one on either side of the posterior median line (Plate IV, C, D, E).

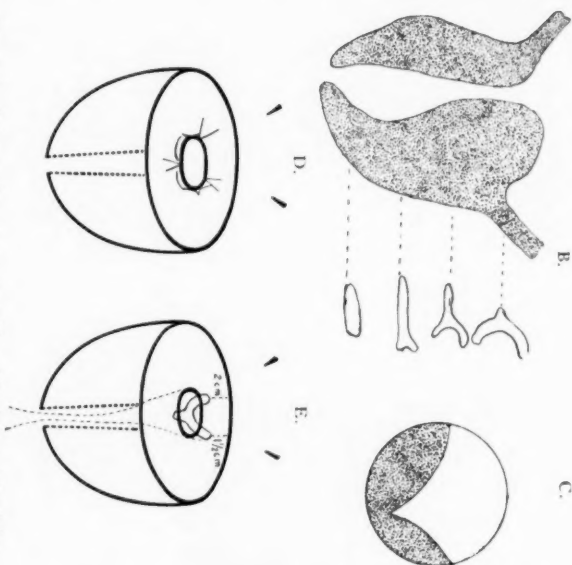
(1) *Passage of the Instrument into Bladder*.—The instrument in its passage through the prostatic urethra will remain in the median line until it reaches its upper part, where the beak, meeting the median obstruction, will rotate to one or the other sides of it, and thus enter the bladder through one of the clefts. The side to which the beak rotates is usually the larger cleft. By withdrawing the instrument to the point where the beak rotates back to the median line, it may be made to enter the bladder through the other cleft by rotating it slightly to the opposite side, as it is gently pushed inward towards the bladder. This is true only when the clefts are of nearly equal size. This will be clear by comparing Plates IV and VII.

(2) *Observing the Appearance of the Bladder Outlet*.—The cystoscope views will show a cleft on either side of a median posterior point, which clefts are situated at the ends of the U-shaped urethra (Plate IV, A, B, C, D, E). When the middle lobe is small, it is sometimes seen as a distinct tumor springing from the posterior edge of the prostatic urethra. The larger forms, owing to the limited fields of vision of the

PLATE VI.

ENLARGEMENT OF BOTH LATERAL LOBE AND THE MEDIAN LOBE.

A. Photographed specimen. B. Mesial section of the prostate and cross-section of the prostatic urethra. C. The cystoscopic picture of the left cleft. D. Diagram of the different cystoscopic fields. E. The actual shape of the vesical orifice and prostatic urethra.



A. Photograph of a prostate with hypertrophy of both lateral and the median lobes. The clefts of the urethra are seen at either side of the median lobe which extends into the urethra. The large, smooth surface on the lateral lobes is the opened urethra, and shows the large degree of anteroposterior dilatation present. Note that the projection of the median lobe makes the urethra V-shaped, a cleft running to either side of the growth.

B. Mesial section of the prostate with cross-sections of the prostatic urethra. The mesial section shows the narrowing of the upper half of the urethra anteroposteriorly, due to encroachment of the median lobe. The lower half is dilated anteroposteriorly from the pressure of the enlarged lateral lobes. The cross-sections show the shape of the urethra at the different levels.

C. The cystoscopic picture of the right urethral cleft. A similar cleft is seen to the left of the median enlargement, and another in the middle anterior extremity of the urethra.

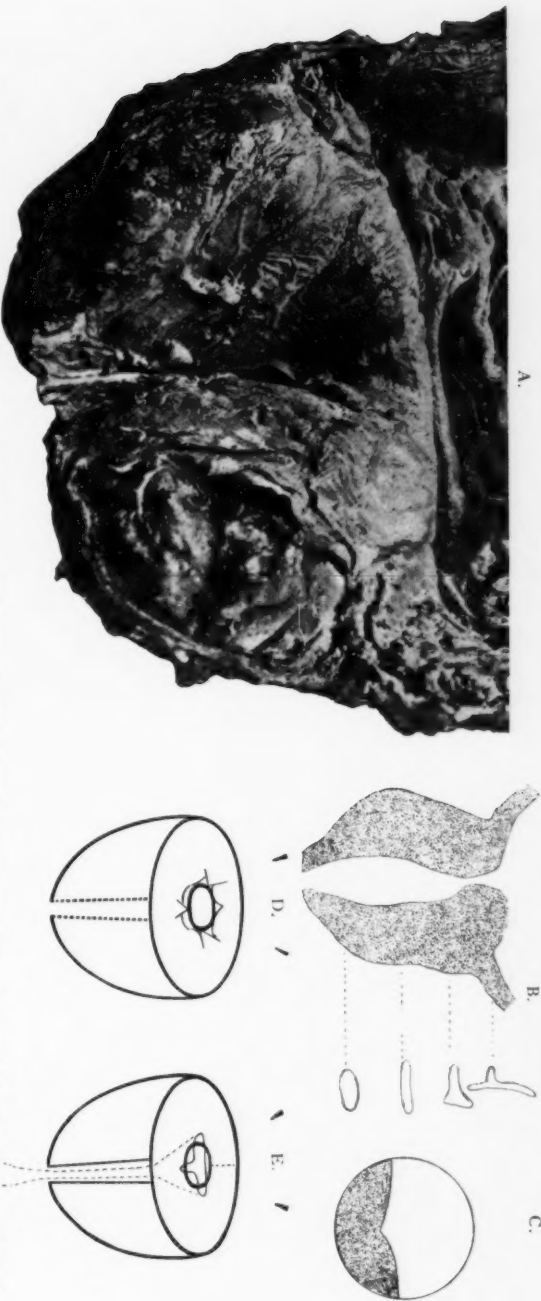
D. A diagrammatic record of the different cystoscopic fields of the vesical orifice, showing a cleft at either side of the posterior median line, which area is occupied by the median lobe, and also at the median anterior extremity of the vesical orifice, which is produced by the compressing lateral lobes.

E. The actual shape of the vesical outlet and prostatic urethra determined by transposing the inverted cystoscopic pictures recorded in D. The upper half of the urethra is dilated laterally and semilunar in shape; the lower half is dilated anteroposteriorly from the pressure of the bilaterally enlarged lateral lobes. The prostatic urethra is lengthened.

PLATE V.

ENCROACHMENT UPON THE PROSTATIC URETHRA BY A POSTERIOR BAR.

A. Photograph specimen. B. Mesial section of the prostate and urethra. C. Cystoscopic picture of the right cleft. D. Diagram of the different cystoscopic fields. E. The actual shape of the vesical orifice and prostatic urethra.



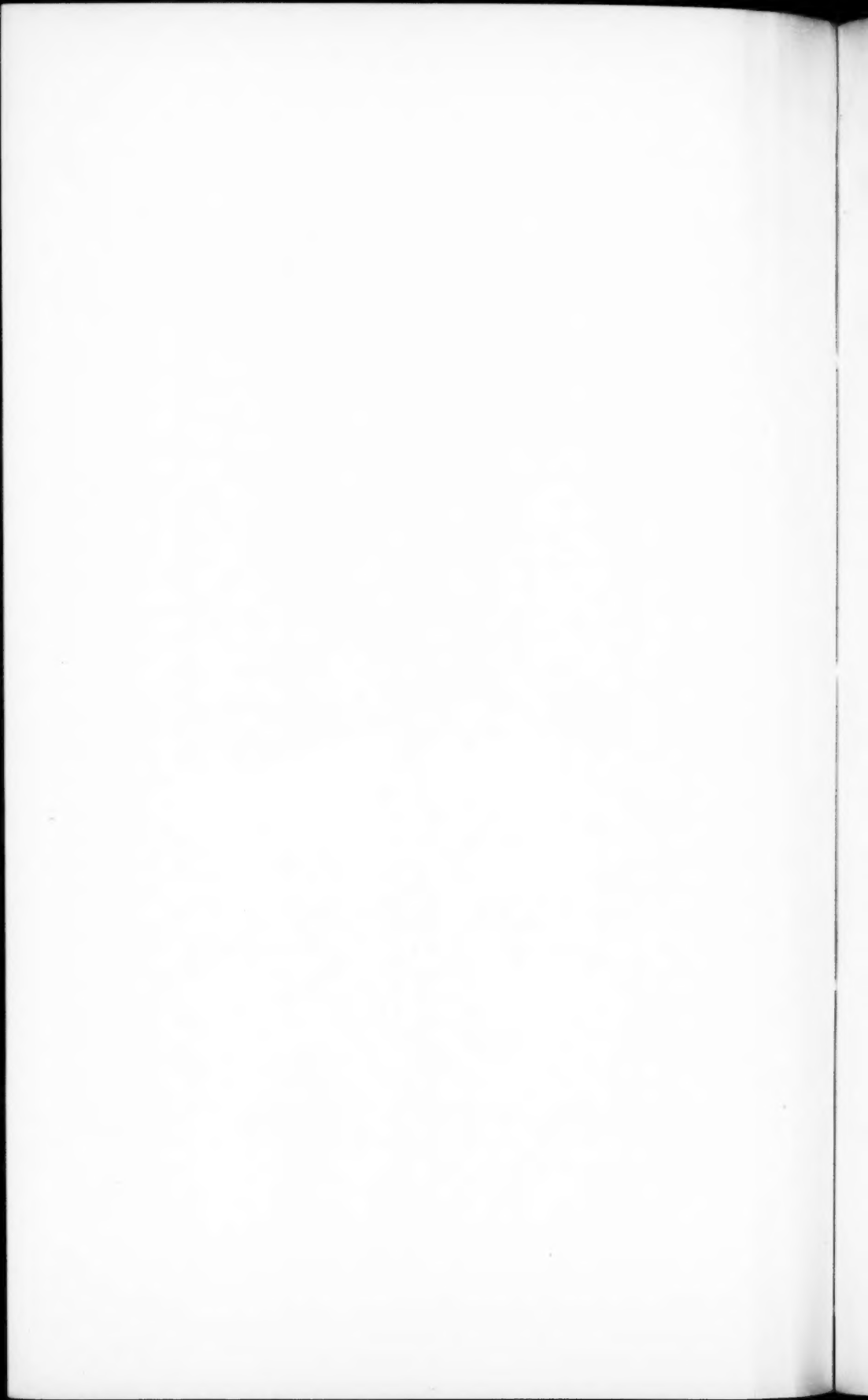
A. Photograph of a specimen with a posterior bar formation and associated double lateral lobe hypertrophy. At the vesical orifice the bar dilates the urethra laterally, while deeper in the urethra the pressure from the lateral lobes dilates it anteroposteriorly.

B. Mesial section of the prostate and cross-section of the prostatic urethra. The mesial section shows the narrowing anteroposteriorly of the upper part of the prostatic urethra due to the bar encroachment and its dilating anteroposteriorly below it, due to the lateral pressure of the hypertrophied lateral lobes. The cross-section shows the shape of the urethra at the different levels.

C. The cystoscopic picture of the small cleft at the junction of the posterior bar and right lateral lobe. A similar cleft is seen to the left end of the laterally dilated urethra. There is also a cleft, rather deep, in the anterior median line, due to a slight degree of lateral lobe pressure upon the vesical orifice.

D. A diagrammatic record of the different cystoscopic fields of the vesical orifice, showing a cleft at either end of the laterally dilated urethra, and also one anteriorly, due to slight pressure of the lateral lobes anterior to the posterior bar.

E. The actual shape of the vesical orifice determined by transposing the inverted cystoscopic pictures in D, showing the lateral dilatation of the urethra, due to the posterior bar, and also to the slight anteroposterior dilatation in the anterior portion of the vesical outlet from pressure of the hypertrophied lateral lobes. The prostatic tissue posterior to the vesical outlet is much increased. The prostatic urethra is lengthened.



cystoscope, can only be judged by the position of the clefts, the composite pictures necessary to cover the growth, and the degree and location of the shadow cast by it upon the lighter colored bladder wall.

(3) *Bimanual Examination with the Cystoscope in the Bladder and the Finger in the Rectum.*—In attempting to make the cystoscope beak point posteriorly and maintain a position upon the vesical surface of the gland, the beak will slide into one of the clefts at either side of the median enlargement. Unless the ocular end of the instrument is raised, the beak, if short, will be drawn into the urethra. The amount of tissue between the posterior edge of the cleft and the posterior border of the prostate should be carefully estimated, especially if a Bottini operation is to be performed, because, as seen, an instrument will by choice enter one of the clefts.

The rectal finger will often be unable to detect any median raphe because of its obliteration by the hypertrophied tissue immediately in front of it. The intravesical projection and width of the median lobe are determined by rotating the cystoscope, or the writer's special instrument, from one cleft over the growth and into the other as seen in Fig. 7, thereby gaining approximate estimations of the height and breadth of the intravesical projection. In withdrawing the instrument, the beak, which is turned to one side during its passage through the cleft, will rotate to the median line at the point in the prostatic urethra at which the median lobe ceases to encroach.

Posterior Bar Formation (Plate V).—In this condition the same tissue is hypertrophied as in the third, median, or middle lobe enlargement, the only difference being that the growth does not extend intravesically to such a degree. The vesical outlet is distorted into a transverse slit, but usually, as in the case illustrated, the lateral lobes are also enlarged, and dilate the urethra anteroposteriorly to a greater or less degree, which distortion becomes more evident below the bar encroachment, which is confined to the upper fifth of the prostatic urethra. Thus, upon entering the prostatic urethra with the instrument, there is considerable room anteroposteriorly until

the bar is reached, when the beak may be rotated almost 45 degrees, and enters the bladder with the beak almost transverse to the long axis of the body, or, being forced forward by the bar, will depress the ocular end of the instrument.

As in the case illustrated (Plate V, B, D, E), three clefts are evident, one at either end of the laterally dilated urethra, formed by pressure of the posterior bar, and one in the anterior median line from pressure of the lateral lobes.

(1) *Passage of the Instrument into the Bladder.*—The cystoscope beak will traverse the anteroposteriorly dilated urethra without deviation to one or the other sides until it reaches the posterior bar, where the short Mercier beak, striking the projecting bar, will be forced forward, and, if the vesical orifice is not too firmly pressed upon by the bar, will enter in the median line. If, however, the bar is large and the urethra much dilated laterally, the beak may rotate to an angle of 45 degrees to one side or the other, and enter the bladder through one of the lateral clefts. It is for this type of hypertrophy that the Mercier beak is especially adapted.

(2) *Observing the Appearance of the Bladder Outlet.*—The cystoscopic pictures received by rotating the cystoscope around the vesical orifice show three clefts, two laterally and one in the anterior median line (Plate V, B, D, E). Care should be taken not to mistake a large interurethral bar for hypertrophied prostatic tissue, as previously mentioned (Plate III). In a small contracted bladder, in which the interureteral bar is prominent, it is often difficult to differentiate the two, and the only safe guide will be the location of the urethral clefts.

(3) *Bimanual Examination with the Cystoscope in the Bladder and the Finger in the Rectum.*—The cystoscope beak, pointed posteriorly and drawn against the vesical surface of the prostate and the rectal finger looped over the posterior edge of the glands, will give evidence of the increased amount of tissue between the posterior edge of the urethra and the posterior border of the gland. The median raphe, in bar formation alone, may be absent; but as in the case illustrated, where the lateral lobes are also enlarged, the median raphe was distinct in the lower half of the gland.

Rotation of the instrument over the surface of the prostate shows but little elevation over the posterior and posterior-lateral segments. In withdrawing the instrument, the beak, although in the pronounced cases entering the bladder through one of the lateral clefts, may usually be withdrawn from the median line. It will be felt to slip backward as soon as the bar is passed, and, as in the introduction of the instrument, the beak will not deviate from the median line during the remainder of its withdrawal.

Enlargement of the Lateral Lobes and the Median Lobe (Plate VI).—When both lateral lobes and the median lobe are enlarged, the vesical orifice is Y-shaped. The hollow of the Y is produced by the growth of the median lobe forward, and the stem of the Y by the compression of the urethra from both sides. The stem is long or short, according to the greater or less degree of forward projection of the median lobe, or hypertrophy of the lateral lobes. Clefts are formed one on either side of the median lobe and one at the anterior end of the urethra. The prostatic urethra is lengthened, and at its upper end divided into two channels, one on either side of the median lobe, and which channels terminate as the lateral clefts of the vesical orifice. By studying the figures of Plate VI it will be evident that not only the vesical orifice is Y-shaped, but also the prostatic urethra itself.

(1) *Passage of the Cystoscope into the Bladder.*—The cystoscope beak will deviate to one side or the other during its passage through the upper part of the prostatic urethra; that is, when it arrives at the point of division of the urethra into the channels at the side of the median lobe. One channel is usually larger than the other, and is, therefore, the more natural course for the instrument to take. The presence of a channel on the other side of the median lobe may be demonstrated by withdrawing the instrument just below the point at which the deviation takes place, and, by turning the beak in the opposite direction, make it traverse the channel at the other side of the median lobe into the bladder.

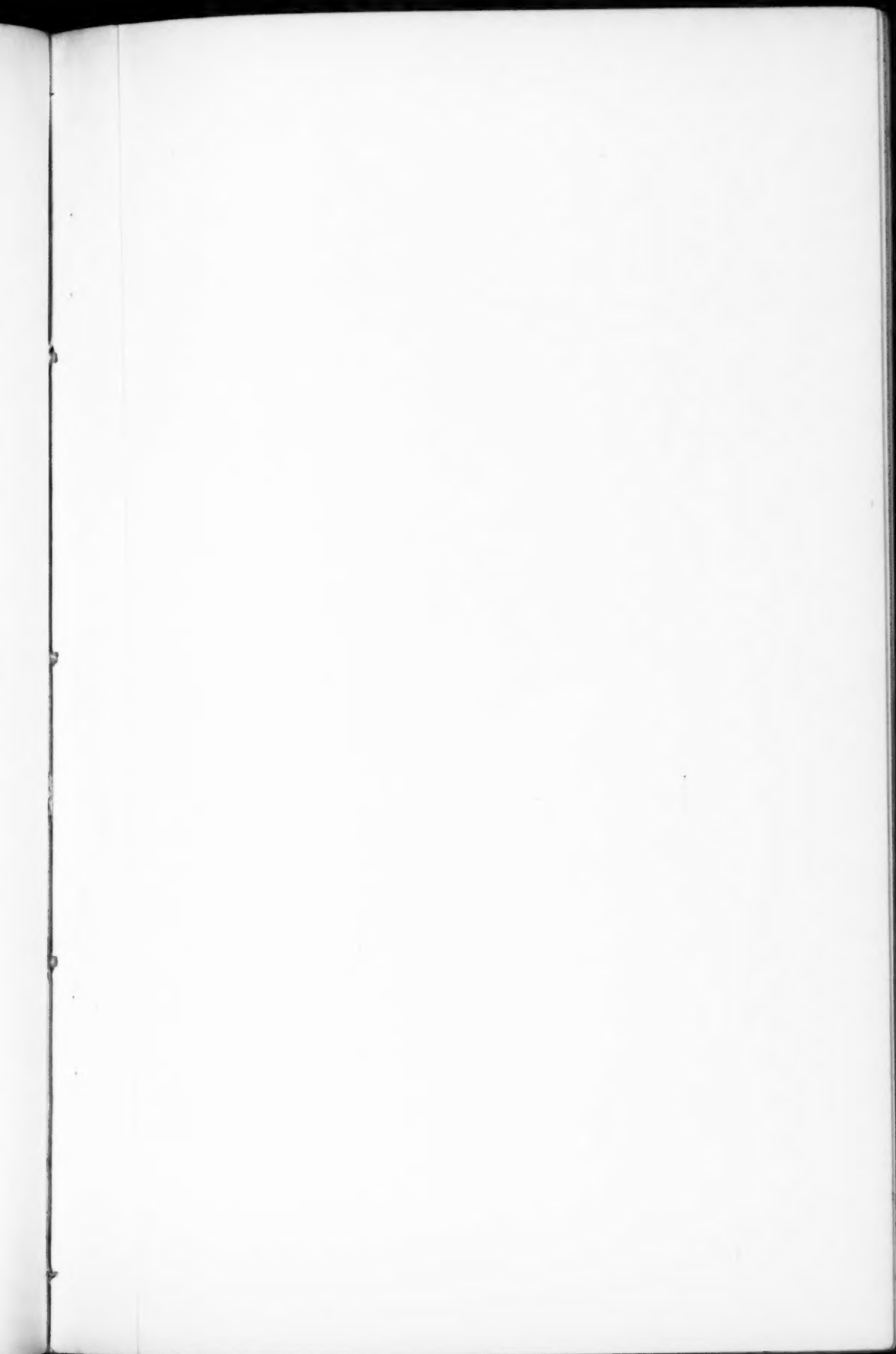
(2) *Observing the Appearance of the Bladder Outlet.*—

The cystoscope will reveal three clefts, one on either side of the median lobe, usually large, and a somewhat smaller one at the anterior median point (Plate VI, A, C, D, E). Some idea of the intravesical projection of the median lobe may be obtained by observing the degree and location of the shadow cast by it upon the lighter colored bladder wall. The size of the median lobe cannot be judged by the number of fields necessary to cover it, because, if it projects into the urethra, as does the illustrated figure, most of the views will be taken with the cystoscope in one of the other clefts, and the lobe may at the same time be pushed to one side by the cystoscope's shaft.

(3) *Bimanual Examination with the Cystoscope in the Bladder and the Finger in the Rectum.*—With the beak of the instrument pointing posteriorly and drawn onto the vesical surface, it will be situated in one of the clefts at either side of the median lobe. The amount of tissue posterior to the urethra from the posterior edge of these clefts is slightly increased. The rectal finger will, as a rule, fail to detect any median raphe because of the hypertrophy of the tissue posterior to the urethra. The enlarged lateral lobes are hard and not sensitive. The length of the prostatic urethra will be found increased. By rotating the cystoscope, or the writer's special instrument, over the vesical surface of the prostate, the degree of elevation and the breadth of the median lobe and of each lateral lobe may be approximately estimated. In withdrawing the instrument, the beak will deviate to one side of the median enlargement, and will remain so until it passes the lowest point of the median encroachment, where it will be held in the median line if the two lateral lobes are equally hypertrophied.

Enlargement and Fusion of the Left Lateral Lobe and the Median Lobe (Plate VII).—As seen in the illustrated case, the left lateral lobe and the median lobe are moderately hypertrophied and fused with one another. The right lateral lobe is also slightly enlarged. The urethral channel passes to the right of the median lobe, where it terminates in a cleft.

A similar somewhat smaller cleft in the anterior median

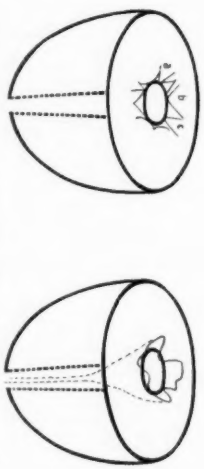
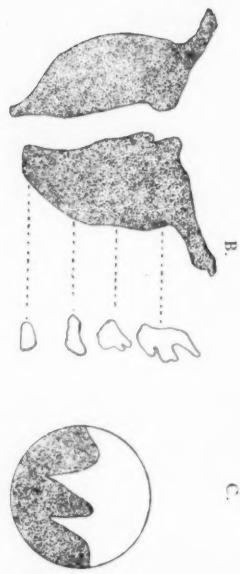


the urethra is sigmoid in shape from the pressing of the lateral lobes. The prostatic urethra is lengthened.

PLATE VIII.

IRREGULAR HYPERTROPHY OF THE MEDIAN LOBE.

- A. Photographed specimen.
- B. Mesial section of the prostate and cross-sections of the prostatic urethra.
- C. Cystoscopic picture of the two left clefts.
- D. Diagrammatic record of the urethral clefts.
- E. The actual shape of the vesical outlet and prostatic urethra.



A. Photographed specimen of a prostate with irregular hypertrophy of the middle lobe. There are three small tumors separated by deep urethral clefts. The bases of the tumors are on the vesical surface of the gland and the apices of the urethra, each tumor forming an irregular cone, between which the urethra is split into three distinct clefts.

B. Mesial section of the prostate and cross-section of the prostatic urethra. The mesial section fails to show the cone-shaped hypertrophies seen in the photograph. The cross-sections give a diagrammatic idea of the irregular shape of the urethra at the different levels.

C. The cystoscopic picture of the two left urethral clefts formed by the cone-shaped hypertrophies.

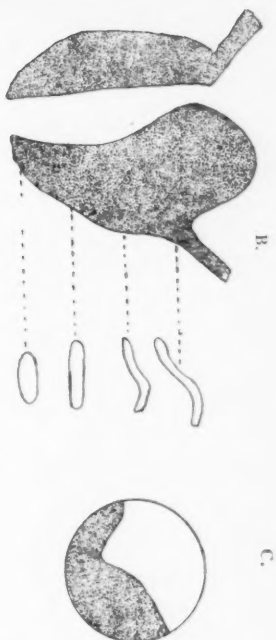
D. A diagrammatic record of the different cystoscopic fields of the vesical orifice, showing the three urethral clefts posteriorly, *a, b, c*.

E. The actual shape of the vesical orifice and the prostatic urethra determined by transposing the inverted cystoscopic pictures of D.

PLATE VII.

ENLARGEMENT AND FUSION OF THE LEFT LATERAL LOBE AND THE MEDIAN LOBE.

A. Photographed specimen. B. Mesial section of the prostate and cross-sections of the prostatic urethra. C. The cystoscopic picture of the urethral cleft to the left of the median lobe. D. Diagram of the urethral clefts. E. The actual shape of the vesical outlet and prostatic urethra.

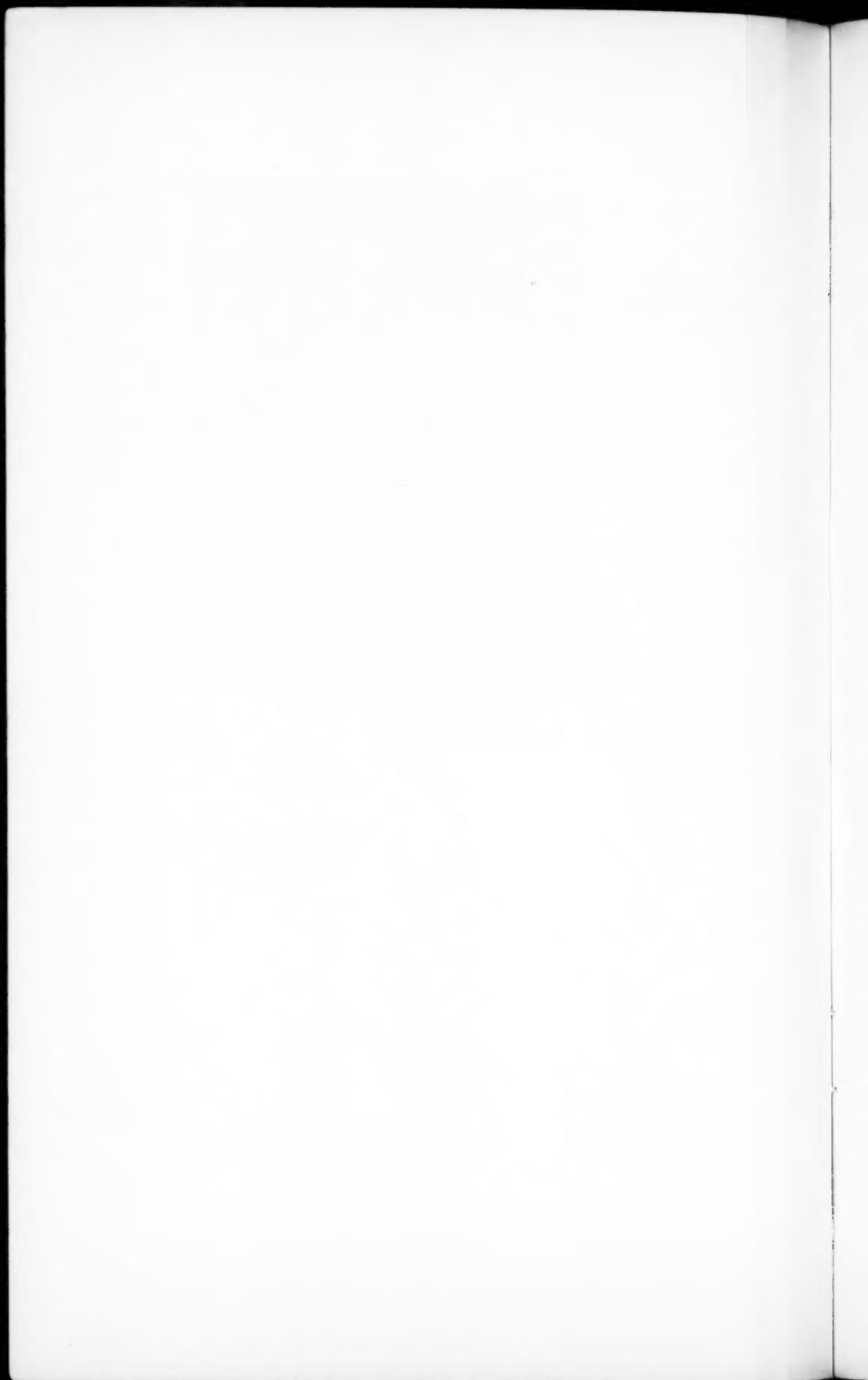


A. Photograph of a prostate with hypertrophy of the left lateral lobe and the median lobe. The enlarged lateral and median lobes are so fused together that one cannot be distinguished from the other. The right lateral lobe, however, is evident, the deflection of the urethra to the right and the sigmoid shape of the vesical outlet is distinct.

B. Mesial section of the prostate and cross-sections of the prostatic urethra at different levels. The mesial section shows the large amount of tissue posterior to the urethra from the enlarged posterior lobes, and also the encroachment of this median lobe upon the upper part of the urethra. Below, the urethra is dilated anteroposteriorly from the pressure of the lateral lobes. The cross-sections show the shape of the dilated urethra.

C. The cystoscopic picture of the urethral cleft. A smaller cleft is also seen at the anterior median border of the vesical outlet.

D. A diagrammatic record of the different cystoscopic fields of the vesical surface. A cleft is seen to the right of the posterior median line, formed by pushing to the right of the urethra by the median lobe. The anterior cleft is due to the pressure of the enlarged lateral lobes. The upper part of the urethra is sigmoid in shape from the pressure of the middle and left lateral lobe. The lower part is dilated anteroposteriorly from the pressure of the lateral lobes. The prostatic urethra is lengthened.



line will give evidence of the sigmoid-shaped vesical outlet (Plate VII, A, B, D, E).

(1) *Passage of the Cystoscope into the Bladder.*—As the instrument meets the lowest point of projection of the median lobe into the urethra, it will be deflected to the right, and will enter the bladder through the cleft at the right of the median lobe.

(2) *Observing the Appearance of the Bladder Outlet.*—The various cystoscopic views will determine the presence of a cleft at the right side of the median lobe and another in the anterior median line (Plate VII, A, C, D, E). Some degree of intravesical projection of the median lobe is evident by the small shadow cast upon the bladder wall.

(3) *Bimanual Examination with the Cystoscope in the Bladder and the Finger in the Rectum.*—When the beak of the cystoscope, or the writer's special instrument, is made to assume a posterior position on the vesical surface of the gland, it will be situated in the cleft at the right of the median lobe. The tissue posteriorly is increased in thickness. The median raphe is obliterated in the upper half of the gland, but is evident below this point. The length of the prostatic urethra is increased. In rotating the instrument over the vesical surface, some idea of the intravesical projection and width of the median lobe is determined. In withdrawing the instrument, the beak will be found to rotate to the right until it passes the lowest point of projection of the median lobe, where it will rotate to the median line and remain so throughout the remainder of the prostatic urethra.

Irregular Hypertrophy of the Median Lobe (Plate VIII).
—This condition, seen in Plate VIII, A, is very unusual. The area usually the site of median lobe enlargement presents three small tumors, which project into the upper part of the prostatic urethra, and which are separated from one another by distinct urethral clefts.

(1) *Passage of the Instrument into the Bladder.*—The cystoscope in its passage through the prostatic urethra will enter one of the three clefts, and thus pass into the bladder.

The beak of the instrument will be deviated in a direction dependent upon the cleft through which it passes.

(2) *Observing the Appearance of the Bladder Outlet.*—Each urethral cleft appears distinct with the cystoscope, and by recording their location the shape of the vesical orifice becomes evident (Plate VIII, D, E).

(3) *Bimanual Examination with the Cystoscope in the Bladder and the Finger in the Rectum.*—When the beak is made to point posteriorly and to assume a position on the vesical surface of the gland, it will be in one of the clefts. The tissue posterior to the urethra at this point in this special case is increased. The rectal finger distinguishes no median raphe, and no evidence of the irregular hypertrophies is demonstrable on the posterior surface of the gland. In the case illustrated, there is no lengthening of the prostatic urethra. In rotating the instrument over the vesical surface of the gland, it is necessary to depress its distal end to make it pass from one cleft to the other, and, as it does so, the largest tumor is felt to slip by the shaft of the instrument. In withdrawing the instrument, the beak will deviate in the direction of the cleft through which it is withdrawn.

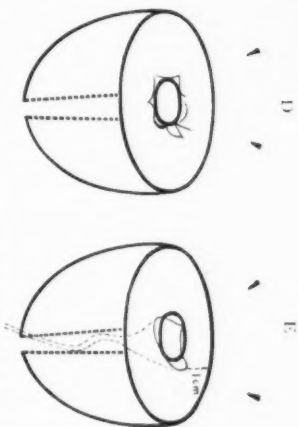
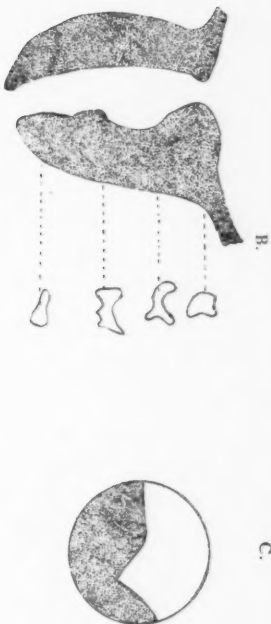
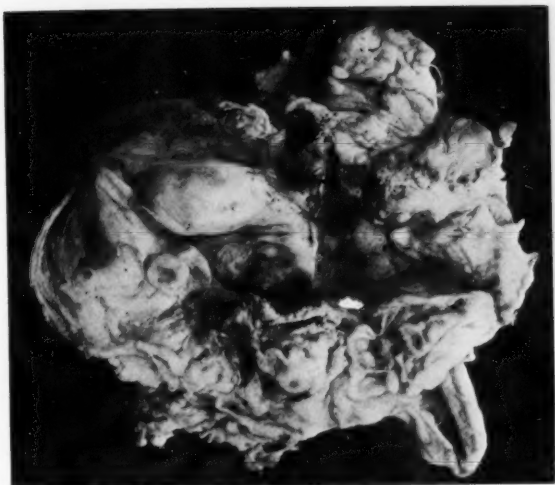
Nodular Hypertrophies Projecting into the Urethra (Plate IX).—Prostatic obstruction due to this form of hypertrophy, although rare, should not be overlooked, and proper skill in the examination should detect the character and site of such prostatic obstruction. As seen in Plate IX, A, the gland is not much enlarged, nor is the vesical outlet distorted as in the usual manner of the more common forms of prostatic hypertrophy. It will be seen that the course of the urethra is tortuous and irregular in its distortion. This is due to nodules, submucous and intramural, projecting into the prostatic urethra. The presence, however, of a nodule at the site of the median-lobe hypertrophy forms a distinct urethral cleft posteriorly and to the left of the median line, and this, together with the other nodulous growths, has changed somewhat the shape of the vesical orifice (Plate IX, B, D, E).

(1) *Passage of the Cystoscope into the Bladder.*—This

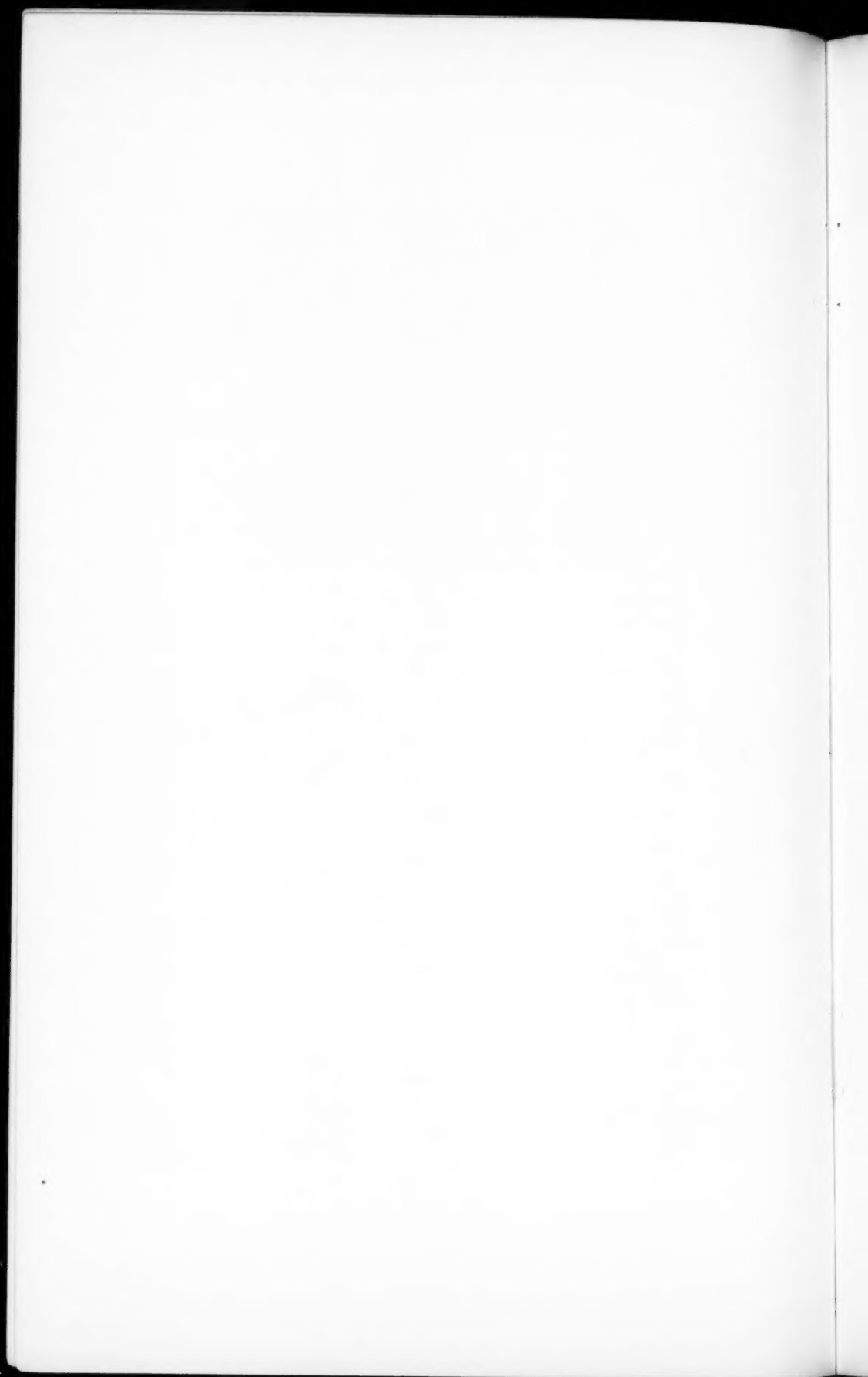
PLATE IX.

NODULAR HYPERTROPHIES PROJECTING INTO THE URETHRA.

A. Photographed specimen. B. Mesial section of the prostate and cross-section of the prostatic urethra. C. Cystoscopic picture of left urethral cleft. D. Diagrammatic record of the various cystoscopic fields. E. The actual shape of the vesical orifice and prostatic urethra.



A. Photographed specimen of nodular hypertrophied areas projecting into the urethra. The chief obstruction is deep in the prostatic urethra, where there is a large intramural nodule pushing the urethra to the left, and a smaller one above it on the left, facing the urethra to the right, making it sigmoid in shape.
 B. Mesial section of the prostate and cross-sections of the prostatic urethra at different levels. The urethra is seen irregularly dilated anteroposteriorly, and the cross-sections show also that the same irregular dilatation has taken place laterally.
 C. The cystoscopic picture of the left urethral cleft formed by the tortuous growth.
 D. The diagrammatic record of the various cystoscopic fields, showing a cleft in the left posterior segment.
 E. The actual shape of the vesical orifice and prostatic urethra determined by transposing the cystoscopic record of D. The tortuous urethra is due to the intramural nodules pushing into the urethra and dilating it in great part anteroposteriorly. It is also increased in length.



step in the examination is the most important in determining this form of prostatic obstruction. As the instrument's beak meets one of the nodular growths, it is deviated to one side, where it remains until it passes over the nodule, when it will again rotate to its former position or assume a new direction from the pressure of another nodule. There is increased resistance to the passage of the instrument during its passage over the nodules, and there may be distinct jumps not unlike that felt in urethral stricture when examining with a bougie à boulé.

In the case illustrated, the instrument enters the bladder with the beak rotated at an angle of about 45 degrees to the left; in other words, it enters through the cleft at the left of the median nodule (Plate IX, A).

(2) *Observing the Appearance of the Bladder Outlet.*—But a single cleft appears in the cystoscopic fields of vision. This and the remaining fields and the actual shape of the vesical orifice are seen in Plate IX (C, D, E).

(3) *Bimanual Examination with the Cystoscope in the Bladder and the Finger in the Rectum.*—The cystoscopic beak, when made to point posteriorly and lie against the vesical surface of the prostate, falls into the cleft at the left of the median nodule. The tissue posterior to the instrument is diminished in amount, while to the right of the cleft it is increased. No median raphe is demonstrable by the rectal finger, and the posterior surface of the gland is nodular. These nodules are hard. By rotating the instrument, no additional information regarding the character of the obstruction is gained. In withdrawing the instrument, the beak will deviate as during its introduction.

NOTE.—The case from which this specimen was taken was operated upon for vesical calculus and the stone removed through a suprapubic incision. The character of the prostatic obstruction was not known at that time. The size of the vesical orifice and the gland itself at this time did not seem to warrant its removal, and the patient's symptoms of obstruction to the outflow

of the urine were considered referable to the vesical calculus present. The symptoms, however, of obstruction persisted for a year following the operation, at which time the patient died.

There are other rare forms of distortion of the vesical outlet which may exist and form clefts of diagnostic significance.

Fig. 8 is an orifice distortion due to enlarged lateral lobes with slight hypertrophy of the prostatic tissue anterior to the urethra. Three clefts are formed, two anteriorly, one on either side of an anterior median joint, and one at the posterior median point.

Fig. 9 is an example of hyperplasia of the tissue of the same area, resembling the condition seen in the posterior lobe

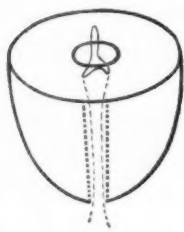


FIG. 8.

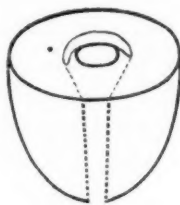


FIG. 9.

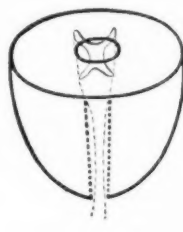


FIG. 10.

hypertrophies. There is a cleft formed at either end of the semilunar-shaped urethra.

Fig. 10 shows hypothetical hypertrophy of both lateral lobes, the posterior lobes, and the tissues anterior to the urethra, all producing distortion of the vesical orifice, and showing the existing clefts which are characteristic of their respective encroachments.

The various forms of hypertrophied prostatic tissue showing obstruction in the prostatic urethra, as evidenced by their characteristic distortions of the vesical orifice, have been noted, together with the discrete nodules projecting into the urethra.

It must be emphasized that the clefts seen by the indirect cystoscopes are inverted, that is, turned upon themselves, so

that to get a correct picture of the shape of the urethral orifice the clefts found must be transposed as illustrated in the plates.

1. *The Condition of the Remaining Portion of the Bladder and the Ureteral Orifices.*—The bladder will in most cases be either contracted or dilated, markedly trabeculated, or, if atonic, smooth with only slight trabeculation, with associated evidence of chronic cystitis. A *bas fond* of varying size will usually be present, and urinary incrustations and stones, so commonly associated with enlarged prostate, should not escape notice.

It is important to note the size of the interureteral bar and ureteral orifices which will give valuable information regarding the degree of the intravesical pressure.

Besides noting the size of the possibly dilated ureteral mouths, it is of importance to establish some idea of each kidney's secretory power by the rate of the ureteral ejaculation, when the conditions render this observation possible.

2. *The Comparative Size of the Various Lobes.*—Various cystoscopic views of the different lobes do not give a trustworthy idea of their respective sizes because of the absence of a sufficient degree of perspective. Some idea of the size of the intravesical growth may, however, be gained by carefully observing the density of the shadow cast by the edge of the prostate onto the surrounding bladder surface, and the relative position of the shadows with the interureteral bar and ureteral orifices. In order to gain approximate estimates of the comparative dimensions, both intravesically and laterally, one must resort to bimanual examination, as already described.

3. *The Length of the Prostatic Urethra.*—All forms of prostatic hypertrophy lengthen the prostatic urethra, especially the posterior enlargements. The determination of the degree of elongation is a very important point if a Bottini operation is to be performed. It is, perhaps, equally as important in influencing any given individual in choosing either the perineal or suprapubic routes for radical operation upon the gland. It may be learned by practising bimanual examination with the

cystoscope or upon the writer's specially devised instrument for this purpose. In using either device, the beak is brought snugly against the vesical surface, so that the tip points posteriorly. The finger in the rectum locates the tip of the instrument, and is then drawn outward over the posterior surface of the gland until the shaft of the instrument is felt as it protrudes from the apex of the prostate. By locating these two points on the instrument, the distance from the vesical surface of the gland to its apex is approximately determined.

This important distance is learned more accurately by the writer's previously mentioned instrument, which, having four grooves on the surface of the shaft, each one centimetre apart, beginning three centimetres from the beak, may be counted off by the finger in the rectum, and the beak being snug on the vesical surface, the length of the prostatic urethra is accurately determined in centimetres (Fig. 7).

METHODS OF RECORDING CYSTOSCOPIC EXAMINATIONS.

It is necessary to record with some degree of mathematical accuracy the various measurements of the abnormalities on the prostatic surface, the shape and size of the vesical orifice, and the length and shape of the prostatic urethra.

Cystoscopic photography may be of service in only a very few cases where small pedunculations are evident in a single cystoscopic field. To record the various cystoscopic fields even by the new Hirshmann or the Casper photographic cystoscope is far from practical, not only on account of the technical difficulties associated with the practice, but because of the unfavorable intravesical condition usually present in this class of cases.

Wax modelling, after the method advocated by Fenwick ("Electrical Illumination of the Bladder and Urethra," 1889, p. 85), may be used to indicate the intravesical condition of the prostatic surface and such distortions of the vesical outlet as may be evident. By this method, however, no information regarding the interurethral conditions can be recorded.

Moreover, the model cannot be constructed during the examination.

Diagrams.—At the meeting of the American Genito-Urinary Surgeons in 1903, Dr. Hugh Young, of Baltimore, demonstrated a new method of recording the appearance of the vesical orifices which is more satisfactory. The diagram upon which the record is made consists of a series of eight rings corresponding to the same number of cystoscopic fields, arranged side by side in the form of a circle. By rotating the cystoscope around the circumference of the bladder outlet and recording each picture in its diagrammatic field, an exact impression is made of the existing condition of the vesical orifice. The pictures thus recorded are, of course, inverted, and an accurate idea of the shape of the vesical orifice is not obtained until the outlines recorded in the respective fields are turned upon themselves, and the shape of the vesical orifice reconstructed in the mind of the operator.

Young's method, like Fenwick's, only enables one to systematically record the condition of the vesical surface of the prostate, and the former's method, being much more technical, is not intelligible to one unfamiliar with this practice.

It has been the writer's custom to record the condition of the vesical orifice by Young's method at the time of the examination, and, jotting down the dimensions of the various lobes and length of the prostatic urethra, to model the gland in waxed clay and file it with each case. This procedure requires considerable time and necessitates much clay.

With the idea of being able to diagrammatically record abnormal conditions existing in any part of the prostate gland, the writer has made accurate measurements of fifty normal prostates, from which a composite has been made as seen in last two diagrams of each illustrative plate.

The measurements taken for this purpose were the length from the vesical orifice to the tip of the prostate, the width of the vesical surface, the anteroposterior diameter of the vesical surface, and the vesical outlet, in its anterior and posterior

diameter. The distance from a centre point in the vesical orifice, and the lowest point of each ureteral orifice, and the width of the trigone from these points were also carefully estimated.

The diameters have been measured and recorded by von Frisch (*Nothnagel Specielle Path. u. Therap.*, 1889, xix, ii, iii, 4) and by Thompson ("The Diseases of the Prostate," 1883, p. 5), which figures correspond with those of the writer, as seen on page 614.

The length of the prostatic urethra as given by von Frisch is 33 to 45 millimetres (Thompson, 25 to 30 millimetres), [author's composite of fifty cases, 40 millimetres]. *Width of the vesical surface*, von Frisch, 34 to 51 millimetres (Thompson, 32 to 40 millimetres), [author, 47 millimetres, of this the vesical orifice in its greatest diameter averages 11 millimetres]. *Thickness*, von Frisch, 13 to 24 millimetres (Thompson, 20 to 25 millimetres), [author's composite, 24 millimetres, of which 13 millimetres was posterior and 11 anterior]. (The composite also shows the left ureteral orifice to be a greater distance from the central point of the vesical orifice than on the right. The left averages 24 millimetres, the right 22 millimetres. The ureteral orifices are apart from one another, 21 millimetres.)

From these measurements the average composite was formed, and made in the form of a stamp. Taking the normal diagrammatic outline, any abnormal conditions may be recorded with pencil at the time of the examination, illustrative examples of which are seen in the last two diagrams of each plate.

In conclusion, I wish to express my thanks to Dr. Abner Post, Dr. Francis S. Watson, and Dr. Paul Thorndike for the privilege of cystoscoping cases while serving as House Surgeon to their wards at the Boston City Hospital.

The writer is also indebted to Dr. Hugh Young for showing him, late in the year 1902, his method of recording cystoscopic views of the prostate. This systematic method has been of much service in making diagrammatic studies of the early cases.

The specimens of Plates II, III, IV, V, VI, and VIII are the property of Dr. Francis S. Watson, and have been published in his admirable monograph of 1888, already referred to. I wish to express my appreciation of his courtesy in allowing me to make use of them in this study.

NOTE.—Since writing this paper, Dr. Young has published a more complete account of his method of recording cystoscopic examinations of the prostate (*Johns Hopkins Hospital Bulletin*, November, 1904, p. 348).

TRANSPERITONEAL LIGATURE FOR ANEURISM OF EXTERNAL ILIAC ARTERY.

BY O. J. CURRIE, M.B., M.R.C.S.,

OF PIETERMARITZBURG, NATAL,

Surgeon to Grey's Hospital and Natal Government Railway Hospital.

THE following case presents two points of interest, which makes it worth recording, firstly, the patient suffered from two aneurisms within the space of three years, which were both cured by ligature; and, secondly, the ease with which the external iliac artery was secured by transperitoneal incision.

H. D., European, aged thirty-six years, was admitted into Grey's Hospital under my care on January 19, 1904, with a sacculated iliac aneurism on the left side.

He stated that he had suffered from syphilis about twenty years previously.

About three years ago he developed an aneurism of the right popliteal artery, for which his femoral artery was tied by Dr. Ward, the result being the complete cure of the aneurism.

About six weeks before admission, whilst lifting a heavy weight, he felt a pain in the right groin. A week later he noticed a pulsating swelling in the groin which was painful, and which rapidly increased in size until his admission into hospital.

On admission there was a large swelling in the left groin about five inches long and about four inches in transverse diameter, extending into the iliac fossa beneath Poupart's ligament, with a tendency to spread towards the anterior superior spine. The pulsation was strongly expansile, and there was a loud systolic bruit heard on auscultation. There was no tenderness on palpation.

The treatment adopted during the first few days was complete rest combined with the administration of large doses of iodide of potassium, and morphia when necessary to relieve pain. The limb was shaved and cleansed and wrapped in antiseptic wadding.

On the 24th and 25th the aneurism increased so rapidly in size that it was decided to operate at once. The increase in the size extended upward into the iliac fossa and involved more of the external iliac artery. The whole limb having again been cleansed and enveloped in antiseptic dressing, the skin of the abdomen was prepared for operation in the usual way. On account of the rapid increase in size, and as the encroachment of the swelling along the external iliac artery rendered it uncertain whether it would be necessary to tie the external or common iliac, the transperitoneal operation through a median incision was decided on. Chloroform was administered, the patient placed in the Trendelenburg position, and a five-inch incision made in the median line of the abdomen. The intestines were pushed up and the abdominal walls well retracted; the peritoneum was then divided over the external iliac artery for about two inches in a line internal to the sigmoid flexure. The artery was well exposed, and a double silk ligature applied and tied in a stay knot as recommended by Ballance and Edwards. The vein was not seen at all during the operation. Pulsation ceased in the aneurism immediately.

A little difficulty was experienced in picking up the peritoneum owing to the depth of the wound, the patient being somewhat stout; but this would have been obviated had a longer pair of forceps been at hand; and on the whole the operation was a fairly easy one.

The peritoneum over the artery having been closed with two or three stitches, the abdomen was sutured in layers. The patient was put to bed and the usual treatment adopted. Twenty-four hours afterwards there was a slight rise of temperature. On the 29th the bowels acted after a dose of salts, and the patient made a satisfactory recovery. The circulation was well maintained in the limb, the aneurism showed no signs of pulsation, on the fourth day after the operation became firm, and in a few days presented a hard, clearly defined outline. Eight days after the operation pulsation could be felt in the posterior tibial artery, and at the end of eight weeks the patient was discharged from hospital cured.

Comparatively few cases of transperitoneal ligature of the iliac arteries have been recorded.

Mr. Clement Lucas related a successful case in the *Lancet* some years ago, but I am unable to find the record.

In Jacobson's "Surgery" (Vol. ii, page 23 *et seq.*) the following cases are mentioned:

Three operated on by Dr. Dennis, of New York.

(1) Ligature of both internal iliacs for pulsating tumors in both gluteal regions. (Median incision.)

(2) Ligature of right internal iliac for gluteal aneurism. (Curved lateral incision.)

(3) Ligature of left internal iliac for aneurismal varix. (Median incision.)

(4) Mr. Yakin's case (*Lancet*, 1892, page 1328). Inguinal aneurism. Ligature of external iliac. (Incision in left linea semilunaris.)

(5) Same patient developed an aneurism on right side, for which right external iliac was tied. (Incision in right linea semilunaris.)

(6) Mr. Mitchell Bank's case. Iliofemoral aneurism; ligature of right external iliac. (Incision in right linea semilunaris.)

(7) Mr. W. H. Brown's case. Ligature of right external iliac for iliofemoral aneurism and femoral aneurism. (Median incision.)

(8) Mr. Wherry (*Lancet*, Vol. ii, 1893, page 136). Ligature of internal iliac for pulsating sarcoma of innominate bone. (Median incision.)

Sir Frederick Treves, in his "Manual of Operative Surgery," Vol. i, page 213, records a case of ligature of internal iliac for vascular tumor of buttock. (Median incision.)

Howard Kelly mentions two cases of ligature of internal iliac by median incision; one for hæmorrhage, the other to check a rapidly growing cancer.

Various methods have been adopted in the treatment of iliac aneurism. Syme's operation is still recommended by some surgeons. Compression has been resorted to, but is not to be recommended, on account of the risk of bruising and injuring the contents of the abdomen.

A successful case of treatment by compression is narrated in the ANNALS OF SURGERY, October, 1903, page 498, by Shepherd, of Montreal. Compression was the treatment adopted, as the patient objected to operation.

Proximal ligation of the artery is the operation usually performed for iliac aneurism, and previous to the days of safe abdominal surgery the operation was always performed extra-peritoneally. But now that the risk of an abdominal section *per se* has diminished to almost nothing, the easiest and most direct method of operating should be adopted.

By operating transperitoneally, the best position to tie the artery can be selected, and a ligature applied on a portion of the vessel sufficiently remote from the disease, and, if found necessary, the common iliac may be tied where the aneurism extends too high up on the external iliac to allow of the ligature being applied to that vessel.

I would recommend a median incision in most cases, as with the Trendelenburg position the intestines fall away from the pelvis, and with suitable retractors the external, internal, or common iliac vessels may be reached. A long pair of forceps should be at hand for the purpose of picking up the peritoneum over the iliac artery, and after incising this membrane a blunt dissector should be employed to push aside the venous plexus and other structures covering the artery, which should be well exposed and tied with silk in a stay knot.

AN OSTEOMA OF THE FRONTAL SINUS.

BY HILL HASTINGS, M.D.,

OF LOS ANGELES, CALIFORNIA.

THE osteoma shown in the photograph was found on making sections of a skull for purposes of study, and is reported to add to the record of such growths, as well as for its slight bearing on transillumination of the frontal sinus.

In reporting a similar case, A. S. Tauber (*Centralblatt für Chirurgie*, July 23, 1898) reviewed the literature, and found that twenty cases of frontal sinus osteomata had been removed by operation, with nine deaths. It has been impossible to find any similar specimen reported in American literature, possibly due to its infrequency, and also to the fact that frontal sinus investigations have been of comparatively recent date.

No history of this case could be obtained; nor would it likely give any symptoms referable to the osteoma.

The specimen was prepared by E. Burchell, formerly one of the assistants in the Pathological Department of the New York Eye and Ear Infirmary, to whom credit is due for many excellent bone specimens.

The view of the osteoma in plate is from above, looking downward and inward, and shows the root of the growth.

The osteoma in this specimen springs from the floor of the left frontal sinus by a short stalk-like neck, about three-quarters of a centimetre in diameter; it is directed upward and inward, enlarges to the size of a small hickory-nut, and almost completely fills the inner half of the sinus. Its measurements are as follows,—two centimetres transversely, two centimetres vertically, one centimetre thick.

Its surface is hard, shiny, and slightly uneven. Its posterior surface is flattened and in contact with the sinus wall. The opening of the nasofrontal duct in the floor of the sinus is not encroached upon by the osteoma, the root of which is about one centimetre to its outer side.

The right frontal sinus is quite large and does not contain any bony growth. The other accessory sinuses are likewise normal.

TRANSACTIONS

OF THE

CHICAGO SURGICAL SOCIETY.

Stated Meeting, December 5, 1904.

The President, DR. L. L. McARTHUR, in the Chair.

RESECTION OF THE JAW.

DR. ALBERT E. HALSTEAD exhibited two patients. The first was a male, aged fifty-five years, who about nine months ago noticed a small lump just at the angle of the right lower maxilla, which continued to increase rapidly in size, and was removed by a surgeon about a month after its appearance. It recurred shortly after the operation, and the patient was subjected to treatment by the X-ray fourteen or fifteen times without any improvement. The patient was admitted to the Cook County Hospital on the 15th of August, last year, and Dr. Halstead operated on the 1st of September, making a unilateral resection of the lower jaw, removing half of the jaw, and patient made a very quick recovery without any unfavorable symptoms. The tumor began in the submaxillary gland, was of very rapid growth, and extremely malignant. At the second operation the incision was made high up on the cheek and about three inches below the jaw; a large defect was left, which was covered by a skin flap taken from the anterior wall of the chest; this healed by primary union. There was no fistula, no great amount of deformity, and the patient can use the jaw freely.

The second case was a man, sixty years of age, upon whom he operated September 17, removing the right half of the inferior maxilla. This patient came from the West. Apparently the tumor began in the mucous membrane at the junction of the alveolar process and the cheek and later involved the jaw. The

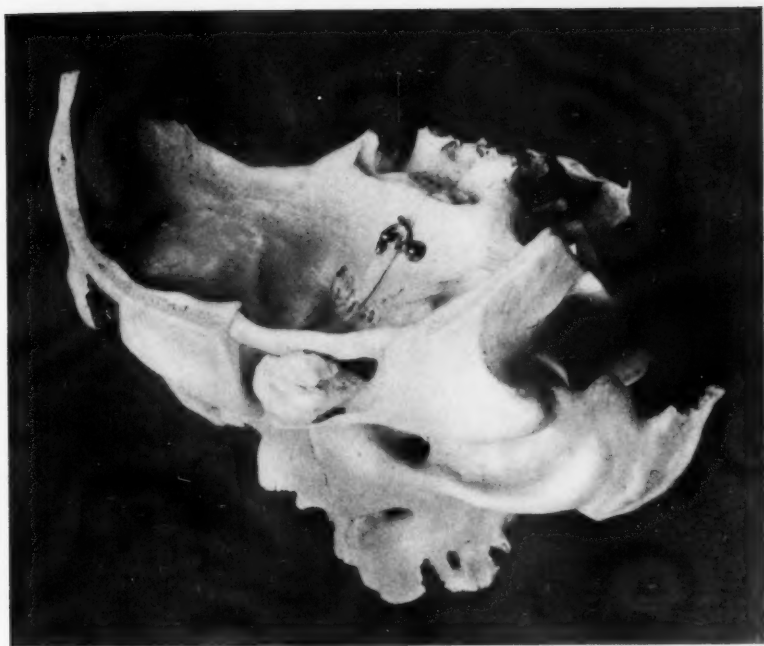
tumor was removed by a surgeon in the West, but the growth recurred immediately, shortly after which patient was admitted to St. Luke's Hospital, where Dr. Halstead resected half of the jaw. This patient had a salivary fistula, from a defect in the duct of the parotid gland. The skin defect in this case was closed in the same way as in the preceding case, by taking a flap from the anterior wall of the chest. The wound healed by primary union, excepting at the opening of the fistula, where drainage was inserted.

The chief reason for bringing these patients before the Society was to get some information as regards the advisability of using a mechanical apparatus of some sort, as a splint, to take the place of half of the jaw, and to prevent the deformity which usually resulted. There had been considerable work done of this kind, one surgeon substituting aluminum, another celluloid, still another hard rubber, and another wire, the splint made to pass from the glenoid cavity to the end of the bone. It was permitted to remain after the wound healed.

Dr. Halstead mentioned a report of six cases published in the *Archives of Surgery*, 1898, by Brendt, in which a splint had been used, and in four of them the splint healed in the wound without suppuration. In one case the patient went for four years without a fistula, the operator having used a celluloid plate. In this case one-half of the inferior maxilla was resected; the mucous membrane of the mouth was closed by suturing, and skin brought up to cover over the defect. From the cuts given in the *Archives of Surgery*, there was practically no deformity. The patient's face was symmetrical, without any of the deformity that is present in the case exhibited. If such results could be accomplished, it would be worthy of trial.

DR. ARTHUR DEAN BEVAN recalled a report he saw recently of a case of Kocher's, in which he (Kocher) had resected the central portion of the jaw, and had filled in a considerable defect by a piece of bone taken from the crest of the ilium, with quite a successful result. It looked rather difficult to believe that a large piece of bone would heal in, and yet the preliminary report gave the result in this case as a success; whether with or without periosteum he did not know. It was wired in place; it was taken from the ilium in the same patient.

DR. JACOB FRANK thought that Dr. Halstead should make



Osteoma of the frontal sinus.

an effort to close the salivary fistula, as the discharge from such a fistula, he thought, would eventually produce carcinoma. He thought it would be wise to secure healing as soon as possible, for, if the glands were cleaned out and there was no return of the disease from the old trouble, there would be a recurrence from the constant irritation of the saliva flowing over the skin.

DR. HALSTEAD said, in regard to the remarks of Dr. Bevan relative to Kocher's operation of taking a piece of bone from the ilium, etc., that this operation was performed a good many years ago by Schlatter, of Zürich, who took a bone graft from the tibia, which resembled half of the inferior maxilla, taking periosteum with it, and, having planted it, it grew successfully. The operation for filling in a defect where a piece of the central part of the jaw was removed was much simpler than to fill in a defect where half of the jaw was removed.

ACTINOMYCOSIS.

DR. ARTHUR DEAN BEVAN read a paper with the above title, for which see *ANNALS OF SURGERY* for May.

DR. JOHN B. MURPHY thought that an important feature brought out by Dr. Bevan was the demonstration of the lymphatic involvement. In none of the cases that came under his observation was it shown that the lymphatic glands became involved, or that the infection was transmitted through the lymphatic chain and arrested in the lymphatic glands.

Another point brought out was the enormous infiltration that occurs around a small focus of suppuration. This was one of the first things that attracted Dr. Murphy's attention in the first case he saw in 1883 (and was the first case in the human subject recognized in this country). This was a typical case of actinomycosis of the jaw in which the infiltration extended down to the neck and infiltrated the neck to the extent of an inch or more on each side. There was apparently a small fluctuating focus. When this area was opened, a number of yellow bodies escaped in the few drops of pus. These all appeared moulded. They were not round, not oval, but moulded and flattened. The specimens he saw at that time under the microscope showed a single star or radiating appearance. Drs. Belfield and Fenger saw the specimens from his first case, and also from the second case of actinomycosis of the jaw, which came under his observation a

short time after the first. The infiltration described by Dr. Bevan in his case of actinomycosis of the pelvis was one of the classical conditions of this disease in the cellular tissue or peritoneum. While the disease seemed to affect bones, muscles, and destroying the tissues with which it came in contact, it elected fatty tissues, and passed by preference along the fatty tissue tracts, not involving skin, muscle completely, or bone, lifting its periosteum, attacking the periosteum, or attacking the fatty tissue close to the periosteum without attacking the bone, *i.e.*, it rarely produces a true osteitis.

The results of treatment had not been very satisfactory. So far as he could tell, his first, second, and third cases recovered; but the fourth case he saw did not recover. This was one of peritoneal actinomycosis where the micro-organisms escaped either through the stomach wall or transverse colon, to appear in the gastrocolic omentum and adjacent peritoneum. There was no perforation in the stomach wall, and none in the large intestine. There was infiltration of fatty tissue on both sides; the micro-organisms passed up into the diaphragm and beneath the surface of the liver.

Of cases of actinomycosis of the appendix he had had two,—one of his own, and another which he saw in connection with Dr. Lee. In the first the actinomycotic process was confined practically within the appendix. Recovery followed extirpation. The case he saw with Dr. Lee pursued an entirely different course. It appeared first as a peri-appendicular abscess under the abdominal wall; it was opened and drained, and the actinomyces were recognized. The process continued to burrow; the sinuses burrowed in all directions down the thigh into the pelvis, over the anterior surface of the bladder to the opposite side, up along the spine, and behind the sacrum. The patient was under observation five or six years; had been subjected to all of the varieties of treatment then in vogue, such as curettement, the application of nitrate of silver, iodide of potash, etc., and the last he heard was that the patient was still having new sinuses, showing that the element of individual resistance had as much to do with the prolongation of life as the element of treatment, and he was pleased to have Dr. Bevan bring that point out in his paper. It was his conviction that there was no specific effect produced by medication so far advised.

DR. E. WYLLYS ANDREWS thought we would have to revise some of our ideas in regard to the curability and frequency of actinomycosis. Dr. Bevan had had in one year more cases of actinomycosis than had often been reported by any one surgeon in that length of time, and a larger per cent. of cures.

It had been the rule probably with all surgeons to make a quick and easy diagnosis in what might be termed the typical and bad cases. Surgeons saw the wooden hardness of the mass, the absence of temperature, and opened the mass, expecting to see the yellow granules, but perhaps did not find them. Specimens were then sent to a microscopist or to the laboratory, and if the ray fungus was not found, the case was put down as not one of actinomycosis. This had been his experience with this disease. However, by being more careful personally in studying the cases, instead of trusting assistants, and making repeated examinations, he had found the mycotic threads. Furthermore, surgeons up to a short time ago looked too much for typical swellings of the jaw and neck, or protruding abscess in the maxillary region, and overlooked the remoter parts. We have been obsessed by the veterinary word "lumpy jaw."

One could not help noticing the large percentage of recoveries that had been referred to by the writer, which was quite contrary to his own experience in the rather limited number of cases he had seen during the past few years. Most of the cases he had seen had either died, or, if they were living, there was an increasing actinomycotic mass in some part of the body. He recalled one man who had a mass in his chest and who, he thought, was going to die.

As to the botanical place of this fungus, it was a parasite on the grass and grain family. It entered the organism through the mouth, except where it entered through some abrasion of the skin. This did not mean that actinomycosis always occurred in the socket of a decayed tooth, spread to the jaw, and involved the neck and so on down into the body; but it meant that some of the fragments of the fungus were adherent to matter ingested or inhaled, and gained access to the respiratory tract or to the alimentary canal. If one would analyze all the cases of actinomycosis of the alimentary canal, he would find scarcely one in the stomach. The probabilities were that the acidity of the stomach prevented the active generation of the germs there. A

comparatively small number was found in the upper intestine. In nearly one-half of all cases reported the actinomycoses were found in the cæcum and in the appendix. Personally, he had not seen a case of actinomycosis like the one reported which involved the rectal region. The cases which he had seen had shown in a few instances bright yellowish, fish-egg-like bodies. Oftener they appeared dark brown. He had also seen bodies that were greenish brown, or with a distinct green cast to them, like sturgeon roe, but more minute.

DR. M. L. HARRIS said the essayist had correctly stated that actinomycosis hominis was much more common than we had supposed. One reason why it had not been more frequently recognized was that we were led to look for actinomycosis about the face, neck, and mouth because the first cases were observed in these regions, and we came to look upon those places as the proper field for actinomycotic infections. Soon we found it in connection with the intestine, and with the respiratory tract, but still looked for an infection always from the surface. It was now known that we might have hæmatogenous infections. While we know that actinomycosis must have gained entrance from the surface at some point, still, it might not have produced any local evidence of the infection at the point of entrance.

He had seen during the past year three cases of actinomycosis which apparently were hæmatogenous infections. The first was in a young lad, a country boy, who came into the hospital with a slowly developing swelling in the prevesical space. It had the characteristic hardness. He opened the mass and obtained a small amount of pus. Inoculations from the pus gave a pure culture of the staphylococcus pyogenes albus. In the first pus which was evacuated, no granules were recognized; but on the dressings a few days after the characteristic granules were at once recognized, and when submitted to the microscope demonstrated to be actinomycosis. This case progressed; the exudate spread; sinuses and fistulæ were formed about the abdominal wall into the lateral wall of the pelvis. He was operated on several times, and these tracts thoroughly cleared out, and during the operations the abdominal cavity was opened, because the speaker was suspicious all the time of a primary intestinal origin. The abscess did not originate in the appendix, nor could he find any point of the intestinal tract that was involved, so he was

unable to explain how the infection reached the prevesical space except through the blood. The patient was subjected to all of the recognized treatments. Iodide of potash was given internally continuously and interruptedly. He was given X-ray treatment very thoroughly, but in spite of all treatment he progressed from bad to worse, and after a period of several months died. A peculiarity of this case was the very marked reduction of the hæmoglobin. The red cells were not reduced in number, about 4,500,000 to 5,000,000; but the hæmoglobin was reduced to a low point before he died.

The second case was in a woman (Chicago woman) who had not lived in contact with any cattle or farm-yard in any way. The disease ran a very slow course, with some pyrexia, the exact cause of which could not be recognized for some time. Finally, a swelling appeared a little to the left of the mid-line just below the costal arch. This was present when he first saw her. He thought it was an abscess; he operated on her; opened the abdomen and found the swelling was in the centre of the left lobe of the liver. He opened it up expecting to get pus, but found none. He found a mass from six to eight centimetres in its longest diameter, and four or five centimetres in its short diameter. He removed a portion of this tissue for microscopic examination and closed the wound. The section showed a mass of degenerated epithelial liver cells undergoing karyorhexis, with loss of staining properties and round-cell infiltration. From a culture he obtained a long spore producing bacillus, but was not able to identify it as any recognized pathogenic organism. She got no better; she soon developed empyema, which he opened, and then obtained actinomycotic granules. He also obtained from this pus the same spore-forming bacillus which he had obtained from the liver. This patient was put on the same line of treatment, iodide of potash, etc.; but she progressed from bad to worse, so that after several months she died.

A third case was under his care at the present time. This patient ran an indefinite history for three or four months, and then came under his observation. He saw the case with Dr. Patton. There was a distinct enlargement in the region of the liver, projecting downward and displacing the kidney anteriorly. He resected the ninth rib and opened an abscess in the right lobe of the liver. Inoculations from this pus were sterile. He got no

growth. In the first pus which escaped no granules were recognized, but when he was watching the dressings a few days after he recognized at once the granules in the discharge. The microscope proved them to be actinomyces. The patient was then put on the iodide of potash. She had progressively grown worse; the disease had involved the lung; she had had an irregular pneumonia in patches, with collapse of a portion of the lung; expectoration bloody. She was still under treatment, but getting worse. This patient showed the same marked reduction of the hæmoglobin. The red cells continued up to 5,000,000, and had all the time. She had marked leucocytosis, the leucocytes varying from 18,000 to 23,000.

These three cases seemed to him to be instances of hæmatogenous infection, the organisms having been carried through the blood, with no local point of invasion, so far as could be determined. These cases showed that there was less resistance to this infection in some patients than in others. The X-ray was used in connection with the iodide and other treatment, yet all three declined; two of them died, and the third probably will before long.

DR. A. J. OCHSNER emphasized some of the points brought out by Dr. Bevan,—first, the diagnosis. He agreed with the essayist that there were a great many cases of actinomycosis in this vicinity, and most of them were not accurately diagnosed. He was interested in actinomycosis because in 1886 he was examining the sputum of a patient for tubercle bacilli and found actinomyces. His attention had been directed to the disease by Dr. Murphy's observations at that time. Dr. Belfield and Dr. Fenger at that time were greatly interested in the case. The case was reported to the Chicago Medical Society, and since that time he had been looking for cases of actinomycosis and had found many of them. He was almost never without a case. He had one at the present time. He recalled over a dozen cases in which the face and neck were involved; one affected the larynx; a number involved the abdomen; one the eighth rib; others the appendix, etc. He had had two or three cases of actinomycosis of the lungs. He had asked a number of these patients what disposition they made of their lumpy-jaw cattle, and invariably the answer was, "We try to sell them. If we can't sell them, we kill them, sell the meat, and it is peddled about and eaten by

different people." He had come across cases in which he was morally certain that the infection came from eating some of this meat that had been peddled about in that manner.

With reference to treatment, he believed that surgeons should follow the methods employed by veterinary surgeons if they wished to succeed in treating actinomycosis. In late cases of actinomycosis in cattle, the veterinary surgeon had the animal killed; he never tried to cure a late case of this disease in cattle. In the early cases an effort was made to remove the entire mass by excision or by splitting it open and curetting it, followed by the administration of iodide of potash in a definite way. If the iodide of potash was given in a case of actinomycosis in the human being, in the manner in which it was administered to cattle, he had no doubt a cure could be effected as readily in man as in animals. Veterinary surgeons gave a large quantity of iodide of potash for several days in succession, and then they interrupted its use for one week, giving the spores time to develop into ray fungi, after which they repeated the iodide of potash for three days, then withdrew it for a week again, and repeated it again; in cases where the actinomycotic process was localized, the cattle would get well. This was the way in which one should treat a human being with this disease. About eight or nine years ago the speaker followed the method of giving the iodide of potash in increasing doses, but in several cases in succession there was apparently no effect upon the actinomycosis until he reached a dose of a drachm, three times a day, and then the progress of the disease began to be arrested. He remembered the first case in which he was impressed with the importance of large doses of iodide of potash very vigorously, and this was an instance in which he operated a dozen times. It was a case of actinomycosis of the scalp. The disease burrowed and burrowed, and every week or so he scraped the scalp more and more and applied every remedy he could think of, without much improvement. However, when he got up to sixty grains of iodide of potash, three times a day, the disease showed manifestations of arrest of development. The next case he had acted in exactly the same way, and since that time he had made it a rule to give ninety grains of iodide of potash in a half pint of hot milk, followed by a pint of hot water, at six in the morning, two in the afternoon, and ten at night, for as many days as the patient can bear taking it up to one week.

If the patient could bear it for a week, it was withdrawn for a week, after which it was repeated for three or four days, then withdrawn again, and repeated once a month. The reason why he repeated iodide of potash once a month was this, that in one of his fatal cases he did this for a time and the patient was apparently well; but about two years later he had a recurrence and died of the disease, there being a circumscribed encysted abscess in the lower end of the right pleural cavity.

Another case was one of actinomycosis of the neck seen six or seven years ago, in which he curetted, gave iodide of potash, etc., in the manner he had just mentioned, and the case did well for two or more months afterwards. In short, the patient seemed to be entirely well. He did not take any iodides for a year, when recurrence took place in the larynx, with œdema of the larynx. The patient returned, as he was almost suffocated. Dr. Ochsner curetted again, gave him iodide of potash in the manner described, continued it for a year, and the patient had been well for four years, to his knowledge. He heard from him last week.

DR. CARL WAGNER said, regarding the liability of the operator occasionally to infect himself during an operation for actinomycosis, that one of the pupils of Professor Sacchi, surgeon-in-chief of the Doges' Hospital of Genoa, Italy, had the misfortune of touching his nose after evacuating an abscess (actinomycotic) of a patient before disinfecting his hands, and thus infected himself. He succumbed very shortly to a fulminant actinomycosis.

The report of one of the cases of Professor Bevan in which the lymphatics were extensively involved recalled a case in his own experience in which serious complications in the form of angina Ludovici following an infection of the lower jaw and parotids, with actinomycosis, required an operation. The patient, a farmer, entered the hospital one Sunday afternoon with symptoms of choking and suffocation. An examination revealed a double swelling, one underneath the chin, very hard and persistent, and another one at the region of the parotids and lower jaw, semi-fluctuant. Both abscesses contained the typical sulphur-yellow miliary bodies of actinomycosis. Evacuation of the abscess, curettage of the cavities, swabbing with Lugol's solution, and hot compresses of boric acid yielded a very satisfactory result in this case. The patient was in the habit of chewing the ear of

the corn while walking through the fields, and undoubtedly contracted his disease in this manner.

DR. L. L. McARTHUR referred to a case the history of which he had just completed for publication in the St. Luke's Hospital Reports. It was interesting in this, that it had almost the classical course, and also showed a great variety of lesions.

The patient was a young woman, a great golfer, out of doors very much, who frequently was rebuked by her husband for plucking at hay and chewing it while playing. She developed a probable actinomycosis of the alveolar process, which required three or four months' treatment before it could be made to heal by a dentist. No actinomycotic infection of the jaw was recognized by the dentist, but only its inveterate character noted. Nine or ten months later, while playing golf in the South, she began to have pain in the right iliac region, and this pain continuing, being of a rather colicky character, on her return home she consulted Dr. Cary, her family physician. Feeling a mass there and noticing she had elevation of temperature, he sent her in to Dr. McArthur's service at St. Luke's Hospital, believing it to be a probable appendiceal abscess, although it was movable, as some of the appendiceal abscesses are when wrapped up in a mass of omentum. Dr. McArthur considered it a case of appendiceal abscess and advised operative interference. On opening the abdomen, there was found a tumor of the ileocaecal region, involving the appendix, ileum, and caecum for a distance of four or five inches on the caecum. This tumor in its clinical aspect, although presenting no miliary bodies on it, seemed to him to be an hypertrophic tuberculosis. On that basis, with the consent of the family physician, he made a resection of the entire ileocaecal region, implanting in the side of the hepatic flexure of the colon the resected ileum. On lifting up from the iliac fossa this mass, a few drops of pus were seen on the fascia covering the iliac muscle. This was mopped up, drainage provided for, and the wound closed. The wound healed after three weeks; the patient left the hospital, and for three months was quite well, when she began to have a cough, with high temperature, chills, and night sweats. During his absence from the city she was seen by his assistant, Dr. Hollister, who considered the case, although he was unable to demonstrate tubercle bacilli in the sputum, one of acute tubercular trouble, the patient having lived in the house of a patient

who had died a few months before with tuberculosis, and many of her living things still being in the house, such as bedding, clothing, etc. On Dr. McArthur's return, the patient being extremely ill, he saw her, and found a tender area, with an enlargement in the neighborhood of Reidel's lobe of the liver. Considered the condition one of hepatic abscess with burrowing through the diaphragm and expectoration. He urged operative interference. The husband refused to have any operation performed until she had become extremely run down and had a temperature varying from 103° to 106° F. for three or four weeks. Then, at his urgent solicitation, the patient was brought to the hospital. He made an incision over this area, and found an abscess which had perforated the posterior sheath of the rectus muscle, in which were then to be seen for the first time the typical granules, and the nature of the case became clear. The patient lingered along for about two weeks, finally dying. A careful post-mortem examination was made by Dr. Hektoen, and a very thorough report of the case was made. In the sputum there was always to be found the typical leptothrix-like threads, but never any suspicion was had of granules. In the abscess opened there were typical granules to be found, and from them cultures were made which proved typically characteristic, so that here was a person in the habit of chewing straw, grain, and hay, who had disease of the jaw, who had a hypertrophic actinomycotic infection, which often is indistinguishable from tuberculosis, who recovered from that, and later developed abscesses, with perforation of the diaphragm. Post-mortem examination showed multiple stomach abscesses burrowing into the diaphragm, and miliary abscesses along the bronchi.

In regard to these club rays, he learned from the paper which Dr. Bevan referred to, namely, that by Dr. Hektoen, and by personal conversation, that the ray was considered now an involution form of organism, not really the typical or characteristic organism in itself.

He was constrained to urge that cases be not considered cured, although healing has taken place, and they have been presented to a medical society. He once presented a case of actinomycosis of the breast and chest wall to the Chicago Medical Society as cured. This case required extensive resection. Three or four weeks after he presented it new fistulæ formed; the

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patient lingered so long in the hospital that finally the hospital authorities felt unable to keep her there longer. All of the recognized treatments were tried; the patient gained in weight, but the fistulæ persisted. After leaving the hospital and having been out of it for six months or more, he was called to her bedside in her last illness, finding this very peculiar and unusual condition, namely, that she had a pyocyaneus pyæmia. The palms of the hands and soles of her feet had multiple, round, small, French-pea-sized abscesses, of a blue-green color, that made it to him extremely difficult to decide what she had. Having a bistoury with him, and these tumors seemed to fluctuate, he took some of the material, recognized that he had abscesses containing *Bacillus pyocyaneus* and demonstrated it. The majority of these abscesses showed upon the soles of the feet and on the palms of the hands; it was on account of these that he was called to see her.

Encouragement from medicine and the use of the X-ray, or from anything at present known, was not to be relied on as curative. He thought the impression should not go forth from the Society that the cases presented by Dr. Bevan were cured. One patient of Dr. Bevan's, as he understood it, might have had pulmonary invasion, but this was not demonstrated, although under the iodide of potash and local treatment the actinomycosis of the neck disappeared. Furthermore, he did not understand that the other cases were reported as cured, and certainly the patients presented were not cured.

PERFORATING GUNSHOT WOUND OF ABDOMEN WITH MULTIPLE INTESTINAL PERFORATIONS; OPERA- TION; RECOVERY.

DR. E. J. SENN reported the case of a man, aged twenty-four years, street-car conductor, who, during an altercation with a negro, was shot in the abdomen with a .38-caliber revolver. The conductor was standing on the rear platform while his adversary stood on the ground six feet away. The shooting took place at 6.30 P.M., March 18, 1904. The patient had partaken of a hearty dinner at twelve o'clock. Shortly before the accident he had eaten two apples. The wounded man was brought to the Presbyterian Hospital immediately. Dr. Senn saw him first at 7.30 P.M., one hour after the accident. His appearance was bad,—blanched

face, anxious expression, pulse quick and thready, and respirations fast and shallow. Examination revealed a large bullet wound located about one inch above McBurney's point. The abdomen was distended with blood, and there was considerable bleeding from the wound. There was dulness in the flanks and some absence of liver dulness. Catheterization yielded several ounces of clear urine.

Immediate operation was decided upon; ether anæsthesia; median incision. Upon opening the peritoneum there was a gush of dark blood and the escape of gas. Large compresses were packed into the abdominal cavity, and the first loop of intestine which presented itself was seized, which proved to be the lower portion of the jejunum. This was given to an assistant, and a search for perforations was made. The intestine was traced in a proximal direction. Four perforations were found and sutured with two rows of stitches, the first through all the coats, and the second with Lembert. Two rents in the mesentery were next closed. In the upper portion of the jejunum the intestine was so badly injured, as well as the mesentery, that resection was necessary. A fine cambric needle with fine silk was used in the circular enterorrhaphy, as well as in the repair of all perforations. Beginning at the mesenteric border, a row of continuous Lembert through-and-through sutures was inserted, and then with the needle armed with the same suture a row of Lembert sutures was introduced. The intestine was next followed to the pylorus. The stomach was slightly distended and intact. Hæmorrhage continued from the left lumbar region. At a point about four inches below the left iliac crest there was a rent in the parietal peritoneum. Examination showed the bullet lying in the soft tissues external to the ilium, having punctured that structure. The left kidney was palpated and found intact. Examination was now continued in a distal direction from the fixed point first held by the assistant, and two perforations were discovered in the ileum and three in the ascending colon near the hepatic flexure. As the patient's condition was now critical, the latter were closed with one row of sutures and the neighboring omentum attached over the line of suture with a few stitches. If the patient's condition had permitted, he would have resected the colon, as the damage to the intestine was extreme. One more perforation in the cæcum was closed. In this locality some faecal matter as well as several

kernels of sweet corn were found in the abdominal cavity. The abdomen was now carefully cleansed by dry sponging, particular care being taken to raise the intestines out of the pelvis in order to remove all blood-clots low down in that cavity. Two large gauze drains were inserted, one to the lowest portion of the pelvis, the other towards the left iliac fossa, where there was considerable oozing. The bullet wound was disinfected and sutured. The wound closed. Patient returned to bed. Pulse, 140; temperature, 98.6° F.; respirations, 26.

During the following two days, strychnine, gr. $\frac{1}{30}$; salt solution, containing one ounce of whiskey, was administered every four hours. Bowels moved on the second day with a simple enema. On March 20, 21, and 22, the patient had constant hic-cough and vomited fecal matter. The strychnine was reduced to gr. $\frac{1}{60}$. Enemata of molasses and milk, one pint of each, resulted in good bowel movements, and the patient soon passed out of danger.

Dr. Senn showed skiagraphs of this case, one of them showing the location of the bullet.

In these cases he believed in using fine silk as suture material, although he was aware that a great many surgeons at the present time preferred catgut. He thought catgut had its place in surgical work, but when it came to intestinal suturing, the use of silk was much more reliable. He also preferred a cambric needle, although the surgeons at the Presbyterian Hospital used a curved surgical needle for intestinal suturing. In introducing the Czerny-Lembert suture, the cambric needle facilitated it to a very large degree.

He also called attention to the use of the omentum in grafting. He was particularly interested in this line of work, having made experiments on dogs, and having reported them to the Society at a previous meeting. In making experiments on animals death resulted in each case; but at that time he reported a case of appendicitis, with fistulous opening, in which the defect was closed with omentum. In this instance he was compelled to use this method, because the patient was in such a bad condition that surgical work had to be done expeditiously. He made use of one row of through-and-through sutures. He put one or two stitches through the omentum, covering the first row of stitches. He did not expect the patient to recover, thinking that later on there

would be perforative peritonitis. In doing enterorrhaphy, he resorted to through-and-through stitches, and then using the same needle armed with the same thread he made a row of Lembert sutures. This enterorrhaphy was done quickly with the use of cambric needle and silk, and he said he could do an ordinary enterorrhaphy as quickly as one could make an anastomosis with the Murphy button. However, in using the button one might save a minute or two of time.

In regard to drainage, he believed that all cases in which there was perforative peritonitis should be drained. He urged that particular attention be given to thorough cleanliness of the abdominal cavity, but he did not believe in free irrigation by salt solution, as this solution had a tendency to disseminate any material which might remain in the abdominal cavity, and thereby a good deal of harm might be done.

A large piece of gauze was inserted well down in the pelvic cavity, and another away over to the opposite side.

In cases of injury to the intestine, the surgeon should be very systematic in his search for perforations. Unless one was methodical, he was very apt to overlook some perforations.

He emphasized the form of enema that was used in this case. This enema was a combination of molasses and milk, one pint of each. In many postoperative cases where he had been unsuccessful in using enemata of turpentine or Epsom salts, he had been successful with molasses and milk. It was agreeable and soothing to the patient. He hoped the members would try this whenever they had inveterate postoperative cases. In one case of intestinal obstruction upon which he was prepared to operate, he succeeded in removing the obstruction with molasses and milk.